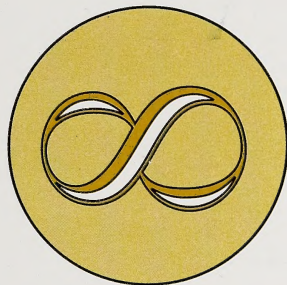




# MATHEMATICS



CANADIANA

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## MODULE 2

### WHOLE NUMBERS AND INTEGERS





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# **Mathematics 8**

## **Module 2: Whole Numbers and Integers**

### **LEARNING FACILITATOR'S MANUAL**

## Note

This Mathematics Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Student's should not have access to these assignments or the final test until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

## Acknowledgements

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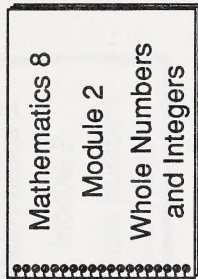
## MODULE INTRODUCTION

### What Lies Ahead

In this module students will be working with whole numbers and integers.

### Gathering Materials

The student will need the following items for the introduction.



### Guiding the Student

- Emphasize to the students that the goal of the section is to preview the module.
- Discuss the learning process, time management, and evaluation with the students. See the suggestion on the next page of this booklet.



## The Learning Process

Each section of Module 2 deals with a different skill involving whole numbers or integers.

Sections have several activities.

- Introductory Activities
- Practice Activities
- Extra Practice
- Concluding Activities

Remind the students that they will not be expected to do all the activities. You will help them decide what to do.

## Time Management

Decide how long the students will need to complete the module. (The average student should spend about 9 weeks in a 40-week year to complete the module. It is recommended that students spend no more than 1 hour at a time doing mathematics.)

## Evaluation

Explain to the students how the module will be evaluated.



## KEEPING SKILLFUL

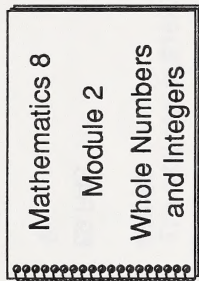
### What Lies Ahead

In this section the student will review these topics.

- operations
- order of operations

### Gathering Materials

For this section the student will need the following items.



### Guiding the Student

- Emphasize to the students that the goal of this section is to review operations with whole numbers.
- Help the students check the answers to the Review and correct any errors. If you discover that a student is still experiencing difficulties, you may wish to have the student do work in Module 2 of Mathematics 7.

**Review**

1. Calculate the exact answers. Do not use a calculator.

a.  $\begin{array}{r} 64 \\ +29 \\ \hline \end{array}$

b.  $\begin{array}{r} 287 \\ +809 \\ \hline \end{array}$

c.  $94 - 37$

d.  $\begin{array}{r} 201 \\ -193 \\ \hline \end{array}$

e.  $\begin{array}{r} 28 \\ \times 19 \\ \hline \end{array}$

f.  $37 \times 68$

g.  $7 \overline{)3310}$

h.  $4395 \div 63$

**Suggested Answers**

1. a. 93

b. 1096

c. 57

d. 8

e. 532

f. 2516

g. 472 R6

h. 69 R48

2. Calculate each of the following mentally.

- |                        |           |
|------------------------|-----------|
| a. $529 + 356$         | 2. a. 885 |
| b. $872 - 356$         | b. 516    |
| c. $8 + 6 + 2 + 5 + 4$ | c. 25     |
| d. $32 \times 40$      | d. 1280   |
| e. $36\,000 \div 600$  | e. 60     |

Use a calculator to do Questions 3 to 5.

3. a. What is the total cost of the skateboard?  
b. How much change is left from \$200?



Deck..... \$88	Wheels..... \$40
Trucks... \$32	Bearings ..... \$ 8

3. a. The total cost is \$168.  
b. The change left from \$200 is \$32.



4. If Gloria's heart beats 69 times in one minute, how many times does it beat in one hour?
4. Gloria's heart beats 4140 times in one hour.
5. The Petersons travelled 570 km in six hours on the first day of their vacation. Find the distance they travelled in one hour.
5. The Petersons travelled 95 km in one hour.
6. Evaluate the following using paper and pencil.
- a.  $29 - 5 \times 3$
- b.  $56 \div (10 + 6 - 8)$
- c.  $7 + 7 \times 7 + 7$
- d.  $\frac{3 \times 5 - 1}{16 \div 8}$
6. a. 14
- b. 7
- c. 63
- d. 7

## GETTING SET

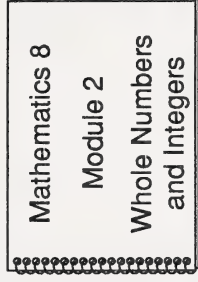
### What Lies Ahead

This section will pretest the following skills.

- finding the factors of a number
- finding the common factors and greatest common factor of two or more numbers
- finding the multiples of a number
- finding the common multiples and the least common multiple of two or more numbers
- expressing numbers in standard form, powers, expanded form, and scientific notation

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students that the goal of this section is to discover their strengths and weaknesses in number theory.
- Help the students check their answers to the pretest. It is not necessary to correct errors at this time. See the last page of this section for further directions.

**Pretest**

- List all the factors of 48, 56, and 80.
  - Identify the common factors.
- Find the greatest common factor (GCF) for each of the following pairs of numbers.
  - 15 and 30
  - 48 and 60
  - 24 and 51
- A bakery sells oatmeal cookies in two different package sizes. The price per cookie is a whole number and remains the same. One package sells for 50¢, the other for 80¢. What is the most that each cookie could cost?

**Suggested Answers**

- The factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48. The factors of 56 are 1, 2, 4, 7, 8, 14, 28, and 56. The factors of 80 are 1, 2, 4, 5, 8, 10, 16, 20, 40, and 80.
  - The common factors of 48, 56, and 80 are 2, 4, and 8.
- The GCF of 15 and 30 is 15.
  - The GCF of 48 and 60 is 12.
  - The GCF of 24 and 51 is 3.
- The most that each cookie could cost is 10¢.



4. List the first five multiples of 13.
5. Find three common multiples for each of the following pairs of numbers.
  - a. 4 and 5
  - b. 9 and 6
  - c. 3 and 9
6. Find the least common multiple (LCM) for each of the following groups of numbers.
  - a. 4 and 9
  - b. 6 and 8
  - c. 6, 9, and 10
4. 13, 26, 39, 52, 65
5.
  - a. 20, 40, 60
  - b. 18, 36, 54
  - c. 9, 18, 27
6.
  - a. 36
  - b. 24
  - c. 90

7. Mark is practising for a marathon. He runs one lap of the practice course in four minutes. His younger brother, Monty, can run the same distance in seven minutes.



- a. If they both start at the same time and keep running until they both cross the finish line together, how long will it take?
- b. How many laps will each have run?
8. Express each of the following as a power.
- a.  $156 \times 156 \times 156 \times 156 \times 156$
- b.  $19 \times 19 \times 19 \times 19 \times 19 \times 19 \times 19 \times 19 \times 19$
7. a. It will take 28 minutes for them to cross the finish line together.
- b. Mark will have run 7 laps and Monty will have run 4 laps.
8. a.  $156^5$
- b.  $19^9$

9. Write each of these numbers in standard form.

a.  $15^2$

b.  $9^4$

c.  $10^5$

9. a. 225

b. 6561

c. 100 000

10. Express each number as a power of 3.

a. 27

b. 243

10. a.  $3^3$

b.  $3^5$

11. Express each of the following standard numbers as a number in expanded form.

a. 2 641 395

b. 13 051 047

11. a.  $(2 \times 1\,000\,000) + (6 \times 100\,000) + (4 \times 10\,000) + (1 \times 1\,000) + (3 \times 100) + (9 \times 10) + (5 \times 1)$

b.  $(1 \times 10\,000\,000) + (3 \times 1\,000\,000) + (0 \times 100\,000) + (5 \times 10\,000) + (1 \times 1\,000) + (0 \times 100) + (4 \times 10) + (7 \times 1)$

Students may also use exponents.

a.  $(2 \times 10^6) + (6 \times 10^5) + (4 \times 10^4) + (1 \times 10^3) + (3 \times 10^2) + (9 \times 10^1) + (5 \times 1)$

b.  $(1 \times 10^7) + (3 \times 10^6) + (0 \times 10^5) + (5 \times 10^4) + (1 \times 10^3) + (0 \times 10^2) + (4 \times 10^1) + (7 \times 1)$



12. Express each of the following as a number in standard form.

a.  $(3 \times 10^4) + (5 \times 10^3) + (7 \times 10^2) + (3 \times 1)$

12. a. 35 703

b.  $(5 \times 10^4) + (9 \times 10^2) + (8 \times 10^1)$

b. 50 980

13. Express each of the following in scientific notation.

a. 12 000

13. a.  $1.2 \times 10^4$

b. 6 165 000

b.  $6.165 \times 10^6$

14. Express each of the following in standard form.

a.  $2.13 \times 10^3$

14. a. 2130

b.  $9.003 \times 10^8$

b. 900 300 000

### Guiding the Student

Help each student decide what to do next. It is recommended that students review the notes in the sections which correspond to the questions in the pretest with which the students experienced success, and that students do a few sample questions from the activities.

It is recommended that students carefully study the notes in the sections which correspond to the questions with which the students experienced difficulty, and that students do most of the questions in the activities.

Question	Skill	Section
1	identifying common factors	3
2, 3	identifying greatest common factors	3
4	identifying multiples	4
5	identifying common multiples	4
6, 7	identifying least common multiples	4
8, 10	expressing numbers as powers	5
9	expressing powers in standard form	5
11	expressing numbers in expanded form	5
12	expressing numbers in standard form	5
13	expressing numbers in scientific notation	6
14	expressing scientific notation in standard form	6





## GREATEST COMMON FACTORS

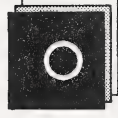
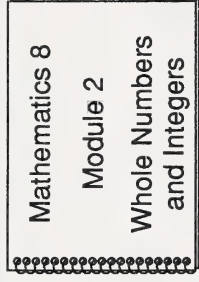
### What Lies Ahead

In this section the student will learn these skills.

- finding the factors of a number
- finding the greatest common factor of two or more numbers
- using the GCF in problem solving

### Gathering Materials

For this section the student will need these items.



(optional)

- *Number Munchers (MECC)*
- *Conquering Whole Numbers (MECC)*
- *Computer Drill and Instruction: Mathematics, Level D (SRA)*

### Guiding the Student

- Emphasize to the students the goal of this section.
- You may wish to use manipulatives with weaker students. These are demonstrated on the video *MATH MOVES: Number Theory*. It is available from ACCESS Network.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

### Computer Alternative



1. Play the game *Factors* on the *Number Munchers* disk (MECC).
2. Play the game *Primes* on the *Number Munchers* disk (MECC).
3. Play the game *Tax Collector* on the *Conquering Whole Numbers* disk (MECC).
4. To review prime numbers and prime factorization, do Lessons 14 and 15 of the *Numbers and Numeration* disk from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA). Remember, if you need help press the SHIFT key and hold down the **?** key.

## Suggested Answers

1. Computer corrected
2. Computer corrected
3. Computer corrected
4. Computer corrected

# Print Alternative



5. Play the game *Place Roll*.<sup>1</sup> You will need a pair of dice, and bingo chips or dried kernels of corn. The game board is in the appendix.
  6. Play the game *Factors*. You will need to cut out the numbers in the appendix. Your goal is to get more points than your opponent.
  7. List the factors of each of the following numbers.
    - a. 36
    - b. 42
    - c. 30
5. Rules for the game are in the module booklet. Discuss the game results with the student.
  6. Rules for the game are in the module booklet. Discuss the game results with the student.
  7.
    - a. 1, 2, 3, 4, 6, 9, 12, 18, 36
    - b. 1, 2, 3, 6, 7, 14, 21, 42
    - c. 1, 2, 3, 5, 6, 10, 15, 30

<sup>1</sup> National Council of Teachers of Mathematics for excerpts from *The Arithmetic Teacher*, September, 1987, Reston, Virginia.

8. Give the prime factors of each of the following numbers.

a. 36

b. 42

c. 30

8. a. 2, 3

b. 2, 3, 7

c. 2, 3, 5

9. Give the prime factorization of each of the following numbers.

a. 21

b. 54

c. 60

9. a.  $3 \times 7$

b.  $2 \times 3 \times 3 \times 3$

c.  $2 \times 2 \times 3 \times 5$



**Practice Activities**

1. List the factors of each of the following numbers.

a. 54

b. 81

c. 63

2. a. List the common factors of 54, 81, and 63.

b. What is the greatest common factor of 54, 81, and 63?

3. Find the greatest common factor for each of these groups of numbers.

a. 6 and 12

b. 30 and 45

c. 42 and 56

d. 8, 16, and 20

e. 24, 40, and 48

**Suggested Answers**

1. a. 1, 2, 3, 6, 9, 18, 27, 54

b. 1, 3, 9, 27, 81

c. 1, 3, 7, 9, 21, 63

2. a. 1, 3, 9

b. 9

3. a. 6

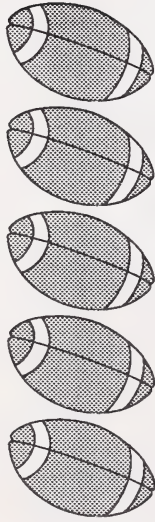
b. 15

c. 14

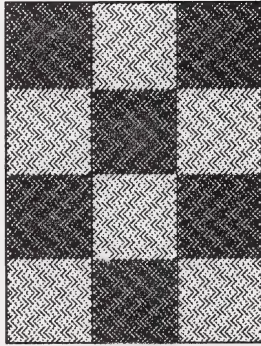
d. 4

e. 8

4. Helga bought some footballs for \$117. Edie bought some of the same footballs for \$78. What is the most that each football could have cost?



5. Julio is making a quilt out of squares of coloured material. His quilt is to be 126 cm wide and 198 cm long. What is the largest size of square that he can use?



# Extra Practice

## Computer Alternative



1. Do Lesson 16 of the disk *Numbers and Numeration* from the package *Computer Drill and Instruction: Mathematics, Level D (SRA)*.

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the ? key.

## Suggested Answers

1. Computer corrected

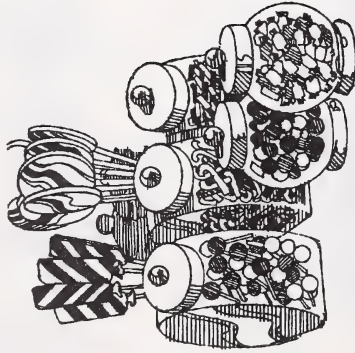
## Print Alternative



2. Find the GCF for each group of numbers.

- |                   |          |
|-------------------|----------|
| a. 24 and 36      | 2. a. 12 |
| b. 12 and 18      | b. 6     |
| c. 30 and 75      | c. 15    |
| d. 48, 64, and 80 | d. 16    |
| e. 500 and 300    | e. 100   |

3. Jennine, Julie, and Joyce bought the same kind of candies. Jennine bought 28¢ worth of candies, Julie bought 70¢ worth of candies, and Joyce bought 98¢ worth of candies. What is the most that each candy could have cost?





**Concluding Activities**

1. For each of the following give the smallest number that has exactly this number of factors.

a. 3

b. 4

c. 5

d. 6

e. 7

f. 8

g. 9

h. 10

**Suggested Answers**

1. a. 4

b. 6

c. 16

d. 12

e. 64

f. 24

g. 36

h. 48

2. a. Find an example in which the sum of the proper factors of a number is less than the number.
- b. Find an example in which the sum of the proper factors of a number is equal to the number.
- c. Find an example in which the sum of the proper factors of a number is more than the number.
3. Are the following pairs of numbers relatively prime? Answer **yes** or **no** and tell why.
  - a. 87 and 53
  - b. 21 and 36
  - c. 45 and 38
  - d. 21 and 93
  - e. 74 and 26

2. a. Answers will vary.  
An example is 4 since  $1 + 2 = 3$ .  
An example is 8 since  $1 + 2 + 4 = 7$ .  
An example is 15 since  $1 + 3 + 5 = 9$ .  
All primes are also examples since the only proper factor of each prime is 1.
- b. Answers will vary.  
An example is 6 since  $1 + 2 + 3 = 6$ .  
An example is 28 since  $1 + 2 + 4 + 7 + 14 = 28$ .
- c. Answers will vary.  
An example is 12 since  $1 + 2 + 3 + 4 + 6 = 16$ .  
An example is 18 since  $1 + 2 + 3 + 6 + 9 = 21$ .  
An example is 20 since  $1 + 2 + 4 + 5 + 10 = 22$ .
3. a. Yes, 87 and 53 are relatively prime since their G.C.F. is 1.
- b. No, 21 and 36 are not relatively prime since their G.C.F. is 3.
- c. Yes, 45 and 38 are relatively prime since their G.C.F. is 1.
- d. No, 21 and 93 are not relatively prime since their G.C.F. is 3.
- e. No, 74 and 26 are not relatively prime since their GCF is 2.

## LEAST COMMON MULTIPLES

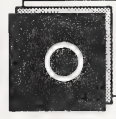
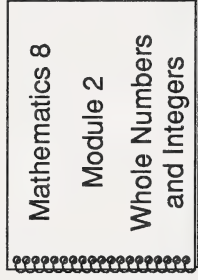
### What Lies Ahead

In this section the student will learn these skills.

- listing the multiples of a number
- finding the least common multiple
- using the least common multiple to solve problems

### Gathering Materials

For this section the student will need these items.



(optional)

*Computer Drill and Instruction:  
Mathematics, Level D (SRA)*

### Guiding the Student

- Emphasize to the students the goal of this section.
- You may wish to use manipulatives with weaker students. These are demonstrated on the video *MATH MOVES: Number Theory*. It is available from ACCESS Network.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

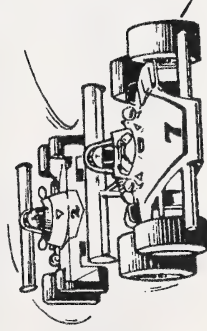
**Practice Activities****Suggested Answers**

1. a. List the first 10 multiples of each of these numbers.  
    - 6
    - 9
  - b. Circle the common multiples of 6 and 9.
  - c. Put a square around the least common multiple of 6 and 9.
2. Give the first three common multiples for each of the following pairs of numbers.
    - a. 7 and 11
    - b. 13 and 2
    - c. 4 and 6

1. a. The first 10 multiples of 6 are  
6, 12, 18, 24, 30, 36, 42, 48, 54, and 60.  
The first 10 multiples of 9 are  
9, 18, 27, 36, 45, 54, 63, 72, 81, and 90.
  - b. 6, 12, 18, 24, 30, 36, 42, 48, 54, 60  
9, 18, 27, 36, 45, 54, 63, 72, 81, 90
  - c. 6, 12, 18, 24, 30, 36, 42, 48, 54, 60  
9, 18, 27, 36, 45, 54, 63, 72, 81, 90
2. a. 77, 154, 231
- b. 26, 52, 78
- c. 12, 24, 36



3. Find the LCM for each of these groups of numbers.
- 4, 6, and 10
  - 3, 8, and 10
  - 2, 3, 4, and 5
  - 16 and 18
4. Camilla's race car takes nine minutes to circle the track while Kevin's goes around in 12 minutes.
- What is the least amount of time in which they could cross the finish line together?
  - Who will have completed more laps? How many more?

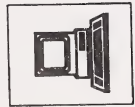


- 60
  - 120
  - 60
  - 144
4. a. The least amount of time in which they could cross the finish line together is 36 minutes.
- b. Camilla will have completed 1 more lap than Kevin.


# Suggested Answers

## Extra Practice

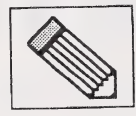
### Computer Alternative



1. Do Lesson 17 of the disk *Numbers and Numeration* from the package *Computer Drill and Instruction: Mathematics, Level D (SRA)*.

Read the instructions included with the disk before you use the program. If you need help, remember to hold down the SHIFT key and press the  key.

### Print Alternative



2. Play *The LCM Game*<sup>1</sup>. You will need a partner, a pair of dice, and 20 discs (bingo chips or dried kernels of corn). The game board is in the appendix.
2. Rules for the game are in the module booklet. Discuss the game results with the student.

<sup>1</sup> National Council of Teachers of Mathematics for excerpts from the *The Arithmetic Teacher*, September, 1987, Reston, Virginia.

3. Find the LCM for each of the following pairs of numbers.

a. 9 and 12

b. 12 and 15

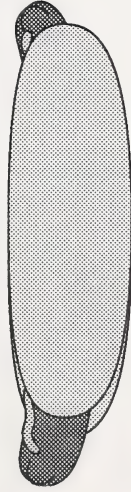
c. 11 and 13

4. Find the LCM for the following groups of numbers.

a. 14, 21, and 49

b. 16, 18, and 24

5. You can buy wieners in packages of 10 and buns in packages of 12. If you want to have an equal number of wieners and buns, what is the lowest number of packages of each that you should buy?



3. a. 36

b. 160

c. 143

4. a. 294

b. 144

5. You should buy 5 packages of buns and 6 packages of wieners.

6. Majeed replaces the plants in his restaurant to keep them looking fresh and nice. One type gets replaced every eight weeks. Another type gets replaced every 12 weeks.



- a. If Majeed begins on January 1, how many weeks will it be until both types of plants get replaced at the same time?
- b. How many times in the year will both types get replaced at the same time?
6. a. It will be 24 weeks before the plants will be replaced at the same time.
- b. The plants will be replaced at the same time twice in the year.



## Concluding Activities

- Find the product of 18 and 24.
  - Find the GCF and the LCM of 18 and 24.
  - Find the product of the GCF and the LCM and compare it to your answer in Part a. of this question.
  - Repeat the procedure for the numbers 20 and 56.
- What statement can you make about the product of two numbers and the product of their GCF and LCM?
  - How can you find the GCF of two numbers if you know the numbers and their LCM?
  - Can you use the same idea to find the LCM if you know the numbers and their GCF?

## Suggested Answers

- 432
  - The GCF of 18 and 24 is 6.  
The LCM of 18 and 24 is 72.
  - The product of the GCF and LCM is the same as the product of 18 and 24.
  - The product of 20 and 56 is 1120.  
The GCF of 20 and 56 is 4.  
The LCM of 20 and 56 is 280.  
The product of the GCF and LCM is 1120.
- The product of two numbers is equal to the product of their GCF and LCM.
  - Divide the product of the two numbers by their LCM to find their GCF.
  - Yes. Divide the product of the two numbers by their GCF to find their LCM.



## POWERS

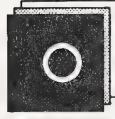
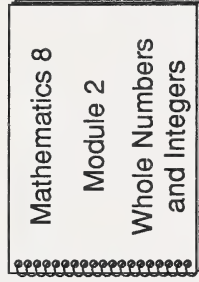
### What Lies Ahead

In the section the student will learn these skills.

- expressing a product of equal factors as a power
- evaluating powers

### Gathering Materials

For this section the student will need these items.



*Computer Drill and Instruction:  
Mathematics, Level D (SRA)*

### Guiding the Student

- Emphasize to the students the goal of this section.
- You may wish to use manipulatives with weaker students.  
The video *MATH MOVES: Number Theory* may be helpful.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Practice Activities**

1. In each of the following expressions, tell which number is the exponent and which number is the base.

a.  $4^3$

b.  $3^{10}$

c.  $2^6$

2. Express each of the following groups of factors as a power.

a.  $4 \times 4 \times 4 \times 4$

b.  $17 \times 17 \times 17$

c.  $121 \times 121 \times 121 \times 121 \times 121 \times 121 \times 121$

**Suggested Answers**

1. a. 3 is the exponent. 4 is the base.

- b. 10 is the exponent. 3 is the base.

- c. 6 is the exponent. 2 is the base.

2. a.  $4^4$

b.  $17^3$

c.  $121^7$

3. Write each number in standard form.

- |    |        |  |
|----|--------|--|
| a. | $3^5$  |  |
| b. | $4^7$  |  |
| c. | $11^4$ |  |
| d. | $10^6$ |  |

4. Complete the following table.

	Exponential Form	Base	Exponent	Meaning	Standard Form
a.	$5^2$	5	2	$5 \times 5$	25
b.	$2^5$	2	5	$2 \times 2 \times 2 \times 2 \times 2$	32
c.	$6^4$	6	4	$6 \times 6 \times 6 \times 6$	1296
d.	$4^2$	4	2	$4 \times 4$	16
e.	$10^8$	10	8	$10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$	100 000 000
f.	$3^3$	3	3	$3 \times 3 \times 3$	27
g.	$7^3$	7	3	$7 \times 7 \times 7$	343
h.	$2^6$	2	6	$2 \times 2 \times 2 \times 2 \times 2 \times 2$	64



5. Write each number in expanded form using powers.

a. 983 765

b. 1 083 975

6. Write each number in standard form.

a.  $(3 \times 10^5) + (4 \times 10^3) + (5 \times 10^2)$

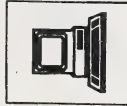
b.  $(9 \times 10^6) + (5 \times 10^1) + (3 \times 1)$

5. a.  $(9 \times 10^5) + (8 \times 10^4) + (3 \times 10^3) + (7 \times 10^2) + (6 \times 10^1) + (5 \times 1)$


b.  $(1 \times 10^6) + (8 \times 10^4) + (3 \times 10^3) + (9 \times 10^2) + (7 \times 10^1) + (5 \times 1)$

6. a. 304 500

b. 9 000 053

**Extra Practice****Computer Alternative**

1. Do Lessons 9, 10, and 11 of the disk *Numbers and Numeration* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the  key.

**Print Alternative**

2. Express each expanded form as a power.

a.  $2 \times 2 \times 2 \times 2$

b.  $3 \times 3 \times 3 \times 3 \times 3$

c.  $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$

d.  $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

2. a.  $2^4$

b.  $3^5$

c.  $5^7$

d.  $10^6$

**Suggested Answers**

1. Computer corrected

3. Express each power in standard form.

a.  $4^3$

b.  $20^2$

c.  $13^3$

d.  $100^3$

3. a. 64

b. 400

c. 2197

d. 1 000 000

4. Express each number in expanded form using powers.

a. 78 956

b. 103 982

4. a.  $(7 \times 10^4) + (8 \times 10^3) + (9 \times 10^2) +$

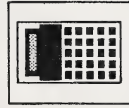
$(5 \times 10^1) + (6 \times 1)$

b.  $(1 \times 10^5) + (3 \times 10^3) + (9 \times 10^2) +$

$(8 \times 10^1) + (2 \times 1)$

**Concluding Activities**

1. Evaluate each of these powers using a calculator.



- a.  $5^6$
- b.  $3^3$
- c.  $25^4$
- d.  $186^2$
- e.  $9^7$
- f.  $23^4$

**Suggested Answers**

1. a. 15 625  
b. 27  
c. 390 625  
d. 34 596  
e. 4 782 969  
f. 279 841

2. Complete each power by supplying an exponent.



- a.  $128 = 2^{\text{■}}$
- b.  $32\,768 = 8^{\text{■}}$
- c.  $279\,936 = 6^{\text{■}}$
- d.  $3\,375 = 15^{\text{■}}$

2. a.  $2^7$
- b.  $8^5$
- c.  $6^7$
- d.  $15^3$

3. a. The standard form of any power with base 5, such as  $5^3$ , will have what number as its final digit?
- b. The standard form of any power with base 6, such as  $6^3$ , will have what number as its final digit?
- c. Can you find any other numbers whose powers all have the same last digit when written in standard form? What are they?

3. a. The standard form of any power with base 5 will have 5 as its final digit.
- b. The standard form of any power with base 6 will have 6 as its final digit.
- c. Answers will vary. The standard form of any power with base 10 will have 0 as its final digit. The standard form of any power with base 11 will have 1 as its final digit.



4. Each number has a repeating pattern of last digits for its powers. For example, all powers of 2 end in 2, 4, 6, or 8.

$$2^1 = 2 \qquad 2^5 = 32$$

$$2^2 = 4 \qquad 2^6 = 64$$

$$2^3 = 8 \qquad 2^7 = 128$$

$$2^4 = 16 \qquad 2^8 = 256$$

So, the last digit repeating pattern for base 2 is

**2, 4, 8, 6.**

Complete the last digit repeating pattern for the following numbers.

a. 3

b. 4

c. 7

d. 8

e. 9

4. a. 3, 9, 7, 1

b. 4, 6

c. 7, 9, 3, 1

d. 8, 4, 2, 6

e. 9, 1

5. Use the patterns you discovered in Question 4 to help you determine the last digits for these powers when expressed in standard form.
- a.  $5^{11}$
  - b.  $4^{21}$
  - c.  $3^9$
  - d.  $2^{49}$
5. a. The last digit will be 5.
- b. The last digit will be 4.
- c. The last digit will be 3.
- d. The last digit will be 2.

6. Find the squares for each of these numbers.

a. 15

6. a. 225

b. 25

b. 625

c. 35

c. 1225

d. 45

d. 2025

7. a. What pattern did you notice in Question 6?

- b. Use the pattern from Question 6 to find  $55^2$  and  $65^2$ .

7. a.  $\begin{array}{c} \textcircled{1} \times 2 \\ \downarrow \\ \textcircled{1}5^2 = \underline{225} \end{array}$   $\begin{array}{c} \textcircled{2} \times 3 \\ \downarrow \\ \textcircled{2}5^2 = \underline{625} \end{array}$   $\begin{array}{c} \textcircled{3} \times 4 \\ \downarrow \\ \textcircled{3}5^2 = \underline{1225} \end{array}$   $\begin{array}{c} \textcircled{4} \times 5 \\ \downarrow \\ \textcircled{4}5^2 = \underline{2025} \end{array}$

b.  $\begin{array}{c} \textcircled{5} \times 6 \\ \downarrow \\ \textcircled{5}5^2 = \underline{3025} \end{array}$   $\begin{array}{c} \textcircled{6} \times 7 \\ \downarrow \\ \textcircled{6}5^2 = \underline{4225} \end{array}$

The last two digits of the answer will always be 25. The front-end digits of the answer will be the product of the first digit of the number being squared and the next consecutive number.



# SCIENTIFIC NOTATION

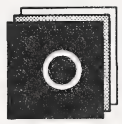
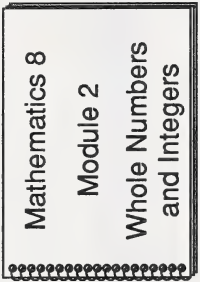
## What Lies Ahead

In this section the student will learn these skills.

- writing numbers in scientific notation
- writing scientific notation in standard form

## Gathering Materials

For this section the student will need these items.



*Computer Drill and Instruction:  
Mathematics, Level D (SRA)*

(optional)


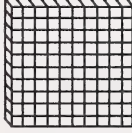
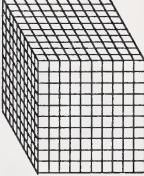
## Guiding the Student

- Emphasize to the students the goal of this section.
- You may wish to have the students work with base 10 blocks to model powers of 10.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.



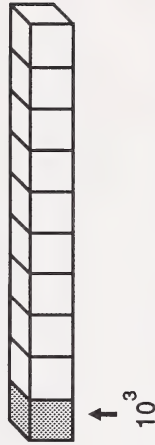
# Introductory Activities

1. First review what the concrete models of the powers of 10 look like. Then answer the following questions.
  - a. What would  $10^4$  look like?
  - b. What would  $10^5$  look like?

Power	Concrete Model	Value and Standard Form
$10^1$	 10 groups of 10	$10^1 = 10 \times 1$ $= 10$
$10^2$	 10 groups of $10^1$	$10^2 = 10 \times 10^1$ $= 10 \times 10$ $= 100$
$10^3$	 10 groups of $10^2$	$10^3 = 10 \times 10^2$ $= 10 \times 10 \times 10$ $= 1\,000$

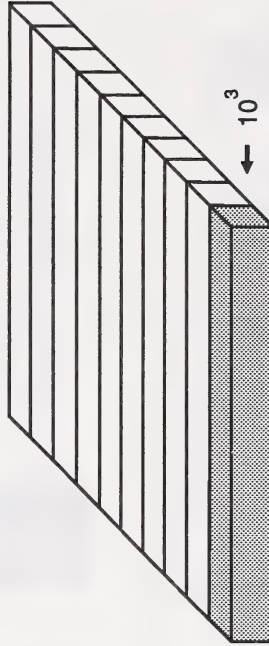
# Suggested Answers

1. a.  $10^4 = 10$  groups of  $10^3$  or 10 000



(This sketch is reduced in size.)

- b.  $10^5 = 10$  groups of  $10^4$  or 100 000



(This sketch is reduced in size.)

2. Evaluate each of these powers. Part a. is done as an example.

a.  $10^4$

b.  $10^5$

c.  $10^8$

d.  $10^{10}$

3. Use the results from Question 2 to complete the following statements.

- When the exponent is 4 and the base is 10, there will be \_\_\_\_ zeros in the answer.
- When the exponent is 5 and the base is 10, there will be \_\_\_\_ zeros in the answer.
- When the exponent is 8 and the base is 10, there will be \_\_\_\_ zeros in the answer.
- When the exponent is 10 and the base is 10, there will be \_\_\_\_ zeros in the answer.

2. a.  $10^4 = 10 \times 10 \times 10 \times 10 = 10\,000$

b.  $10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100\,000$

c.  $10^8 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 100\,000\,000$

d.  $10^{10} = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10\,000\,000\,000$

- When the exponent is 4 and the base is 10, there will be 4 zeros in the answer.
  - When the exponent is 5 and the base is 10, there will be 5 zeros in the answer.
  - When the exponent is 8 and the base is 10, there will be 8 zeros in the answer.
  - When the exponent is 10 and the base is 10, there will be 10 zeros in the answer.

4. Complete each power by supplying an exponent. Part a. is done as an example.

a.  $10\ 000 = 10^{\boxed{4}}$

b.  $1\ 000\ 000 = 10^{\boxed{6}}$

c.  $1\ 000\ 000\ 000 = 10^{\boxed{9}}$

d.  $100\ 000 = 10^{\boxed{5}}$

5. Use the results from Question 4 to complete these statements.

- a.  $10\ 000$  has four zeros and the exponent in the power of  $10$  is 4.

- b.  $1\ 000\ 000$  has six zeros and the exponent in the power of  $10$  is 6.

- c.  $100\ 000\ 000$  has eight zeros and the exponent in the power of  $10$  is 8.

- d.  $100\ 000$  has five zeros and the exponent in the power of  $10$  is 5.

4. a.  $10\ 000 \div 10 = 1000$

$1\ 000 \div 10 = 100$

$100 \div 10 = 10$

$10 \div 10 = 1$

Using the division method, four steps were needed to reach 1.

So,  $10\ 000 = 10^4$ .

b.  $1\ 000\ 000 = 10^6$

c.  $1\ 000\ 000\ 000 = 10^9$

d.  $100\ 000 = 10^5$

5. a.  $10\ 000$  has four zeros and the exponent in the power of  $10$  is 4.

- b.  $1\ 000\ 000$  has six zeros and the exponent in the power of  $10$  is 6.

- c.  $100\ 000\ 000$  has eight zeros and the exponent in the power of  $10$  is 8.

- d.  $100\ 000$  has five zeros and the exponent in the power of  $10$  is 5.

6. Change each of these to standard form. Part a. is done as an example.

a.  $1.575 \times 10^5$

b.  $1.325 \times 10^3$

c.  $4.76 \times 10^4$

d.  $3.82 \times 10^2$

7. Use the results from Question 6 to complete these statements.

a. When you multiply a number by  $10^5$ , the decimal point moves \_\_\_\_ places to the right.

b. When you multiply a number by  $10^3$ , the decimal point moves \_\_\_\_ places to the right.

c. When you multiply a number by  $10^4$ , the decimal point moves \_\_\_\_ places to the right.

d. When you multiply a number by  $10^2$ , the decimal point moves \_\_\_\_ places to the right.

6. a.  $1.575 \times 10^5 = 1.575 \times 100\,000$   
 $= 157\,500$

b.  $1.325 \times 10^3 = 1325$

c.  $4.76 \times 10^4 = 47\,600$

d.  $3.82 \times 10^2 = 382$

7. a. When you multiply a number by  $10^5$ , the decimal point moves 5 places to the right.

b. When you multiply a number by  $10^3$ , the decimal point moves 3 places to the right.

c. When you multiply a number by  $10^4$ , the decimal point moves 4 places to the right.

d. When you multiply a number by  $10^2$ , the decimal point moves 2 places to the right.

**Practice Activities**

1. Which of the following numbers are written in scientific notation?

a.  $6.7 \times 10^{23}$

b. 7 000

c.  $0.4 \times 10^2$

d.  $9 \times 10^1$

e.  $13 \times 10^{29}$

f.  $1.89 \times 5^{10}$

2. Complete each scientific notation by supplying an exponent.

a.  $312.4 = 3.124 \times 10^{\boxed{2}}$

b.  $940\,000 = 9.4 \times 10^{\boxed{5}}$

c.  $10.43 = 1.043 \times 10^{\boxed{1}}$

d.  $6\,000\,600 = 6.0006 \times 10^{\boxed{6}}$

**Suggested Answers**

1. a. Yes

b. No

c. No

d. Yes

e. No

f. No

2. a.  $312.4 = 3.124 \times 10^{\boxed{2}}$

b.  $940\,000 = 9.4 \times 10^{\boxed{5}}$

c.  $10.43 = 1.043 \times 10^{\boxed{1}}$

d.  $6\,000\,600 = 6.0006 \times 10^{\boxed{6}}$



3. Complete the scientific notation for each of the following by writing the correct decimal number in the box.

a.	40 962 000	=	<div style="background-color: #cccccc; width: 100px; height: 1.2em; display: inline-block;"></div>	$\times 10^7$
b.	1 002	=	<div style="background-color: #cccccc; width: 100px; height: 1.2em; display: inline-block;"></div>	$\times 10^3$
c.	980 000 000	=	<div style="background-color: #cccccc; width: 100px; height: 1.2em; display: inline-block;"></div>	$\times 10^8$
d.	55 555	=	<div style="background-color: #cccccc; width: 100px; height: 1.2em; display: inline-block;"></div>	$\times 10^4$

4. Express each of these numbers in scientific notation.

- a. 4 000
- b. 312 000
- c. 9 002 000
- d. 63 500 000 000

5. Express each of the following in scientific notation.

- a. The mass of Earth is 5 984 000 000 000 000 000 t.
- b. The number of salt water molecules on Earth is 120 000 000 000 000 000 000 000 000 000 000 000 000 000 000.
- c. The circumference of Jupiter is about 434 000 km.

3. a. 

4.0962

 $\times 10^7$
- b. 

1.002

 $\times 10^3$
- c. 

9.8

 $\times 10^8$
- d. 

5.5555

 $\times 10^4$

4. a.  $4 \times 10^3$
- b.  $3.12 \times 10^5$
- c.  $9.002 \times 10^6$
- d.  $6.35 \times 10^{10}$

5. a.  $5.984 \times 10^{18}$
- b.  $1.2 \times 10^{47}$
- c.  $4.34 \times 10^5$

6. Express each of the following in standard form.

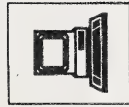
- a. The distance from the sun to Earth is about  $1.5 \times 10^8$  km.
6. a. 150 000 000



- b. The distance from the sun to Jupiter is about  $7.8 \times 10^9$  km.
- c. The number of cells in a bacterial culture is  $4.03 \times 10^{12}$  cells.
- b. 7 800 000 000
- c. 4 030 000 000 000

## Extra Practice

## Computer Alternative



1. Do Lessons 11 and 12 on the disk *Numbers and Numeration* from the package *Computer Drill and Instruction: Mathematics Level D* (SRA).

Read the instructions in the folder with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the ? key.

## Print Alternative



2. Complete each of these expressions.

a.  $23.3 = 2.33 \times 10^{\boxed{\phantom{00}}}$

b.  $10\,090 = \boxed{\phantom{00000}} \times 10^4$

c.  $400\,090 = \boxed{\phantom{00000}} \times 10^5$

d.  $290 = 2.9 \times 10^{\boxed{\phantom{00}}}$

## Suggested Answers

1. Computer corrected

2. a.  $2.33 \times 10^{\boxed{1}}$

b.  $\boxed{1.009} \times 10^4$

c.  $\boxed{4.0009} \times 10^5$

d.  $2.9 \times 10^{\boxed{2}}$

3. Express each of the following in scientific notation.

- a. 872 000
- b. 891 700 000
- c. 532 800
- d. 2 004 000 000

4. Change each of the following to standard form.

- a.  $7.241 \times 10^5$
- b.  $1.4 \times 10^7$
- c.  $3.974 \times 10^8$
- d.  $5.055 \times 10^2$

- 3. a.  $8.72 \times 10^5$   
b.  $8.917 \times 10^8$   
c.  $5.328 \times 10^5$   
d.  $2.004 \times 10^9$
- 4. a. 724 100  
b. 14 000 000  
c. 397 400 000  
d. 505.5

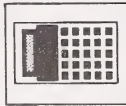
5. Mr. Rajoo's heart beats 70 times in one minute. Calculate the number of times his heart beats over a lifespan of 75 years. Express your answer in scientific notation.



6. If light travels at the speed of 300 000 kilometres per second, how far does light travel in one year? Express your answer in scientific notation.
6. Light travels  $9.4608 \times 10^{12}$  kilometres per year.



## Concluding Activities



1.
  - a. What is the greatest number, in standard form, that can be displayed on most simple calculators?
  - b. What happens when you try to enter 1 673 195 054 into a simple calculator?
  - c. What happens when you multiply  $87\,000 \times 5\,670$  on a simple calculator?
  - d. What happens when you add 52 972 167 and 58 616 790 on a simple calculator?

## Suggested Answers

1.
  - a. 99 999 999
  - b. The display reads as follows.  


The 4 at the end is not displayed.
  - c. The calculator displays an answer and the error symbol.  

  - d. The calculator reads as follows.  


The 7 at the end is not displayed.

## Note

The purpose of this activity is for students to realize that simple calculators do not display numbers greater than 99 999 999. An E is displayed if a product or sum is greater than this number.

2. Scientific calculators use scientific notation to display larger numbers. However, these calculators do not display the multiplication sign and the power of 10. Instead, a space is left between the number and the exponent.

**Example:** When written in scientific notation, a number looks like this.

$$5.138 \times 10^8$$

When displayed in scientific notation on your calculator, the same number looks like this.

**5.138 8**

What do the following displays mean?

a. **4.2719 6**

b. **3.2719 15**

2. a.  $4.2719 \times 10^6$   
b.  $3.2719 \times 10^{15}$



## SUMMARY

### What Lies Ahead

In this section the student will review these skills.

- finding the factors of a number
- finding the common factors and the GCF of two or more numbers
- finding the multiples of a number
- finding the common multiples and the LCM of two or more numbers
- expressing numbers in standard form, powers, expanded form, and scientific notation

### Gathering Materials

For this section the student will need these items.

Mathematics 8  
Module 2  
Whole Numbers  
and Integers



### Guiding the Student

- Emphasize to the students that the goal of this section is to review Sections 2 to 6 and to discover how much they have progressed since the pretest.
- Help the students check their new answers to the pretest in Section 2.



## GETTING SET

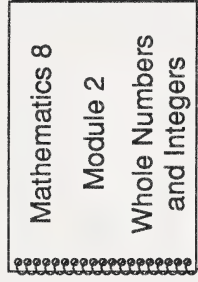
### What Lies Ahead

This section will pretest the following skills.

- adding integers
- subtracting integers
- multiplying integers
- dividing integers
- performing a series of operations

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students that the goal of this section is to discover their strengths and weaknesses in integers.
- Help the students check their answers to the pretest. It is not necessary to correct errors at this time. See the last page of this section for further directions.



**Pretest**

1. Write an integer which represents
  - a. a pay raise of \$300.
  - b. a cheque written on your bank account for \$21.
  - c. 6 700 metres below sea level.
  - d. a golf score of six over par.
  - e. 14 degrees below the freezing point.
2. Write the opposite integer for each of the following.
  - a.  $-46$
  - b.  $198$
  - c.  $-230$
  - d.  $+99$

**Suggested Answers**

1.
  - a.  $+300$
  - b.  $-21$
  - c.  $-6700$
  - d.  $+6$
  - e.  $-14$
2.
  - a.  $+46$
  - b.  $-198$
  - c.  $+230$
  - d.  $-99$

3. Use  $>$  or  $<$  to show the relationship between the integers given in each of these cases.

a. 49  41

b. -49  -41

c. 7  -7

d. -2  1

e. -31  -30

4. Arrange each group of integers in increasing order.

a.  $-2, +14, -20, -14, +7, 0$

b.  $+9, +8, -36, -20, -1, +100, -1\ 000$

3. a.  $49 > 41$

b.  $-49 < -41$

c.  $7 > -7$

d.  $-2 < 1$

e.  $-31 < -30$

4. a.  $-20, -14, -2, 0, +7, +14$

b.  $-1\ 000, -36, -20, -1, +8, +9, +100$

5. Use counters and a container to find these sums and then complete each addition sentence.



- a.  $(+9) + (+2)$   
b.  $(-6) + (+3)$   
c.  $(+4) + (-6)$   
d.  $(-4) + (-3)$

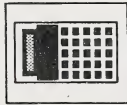
6. Add these integers mentally.

- a.  $(+12) + (-3)$   
b.  $(-4) + (-8)$   
c.  $(+2) + (+3)$   
d.  $(-12) + (+8)$

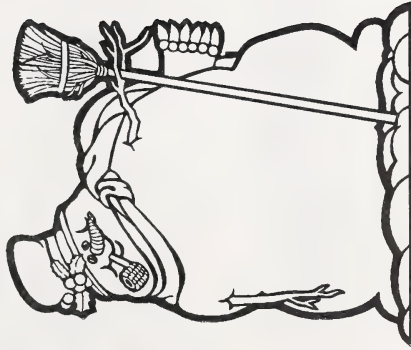
5. The diagrams showing the modelling are on page 72.

- a.  $+11$   
b.  $-3$   
c.  $-2$   
d.  $-7$
6. a.  $+9$   
b.  $-12$   
c.  $+5$   
d.  $-4$

7. Use a calculator to answer these problems.



- a. One day this winter the temperature was  $-13^{\circ}\text{C}$ . It dropped another 10 degrees during that day and a further six degrees overnight. What was the coldest temperature recorded on this particular day?
- b. The next day a chinook raised the temperature by 18 degrees. What was the resulting temperature?



7. a.

Key Press	Display
13	-13
+ 10	-23
+ 6	-29
=	-29

The final temperature was  $-29^{\circ}\text{C}$ .

b.

Key Press	Display
+ 18	-11
=	-11

The temperature was  $-11^{\circ}\text{C}$  after the chinook.

8. Use counters and a container to find each of these differences.

- a.  $(+4) - (+2)$   
b.  $(+6) - (-2)$   
c.  $(-5) - (+3)$   
d.  $(-7) - (-2)$



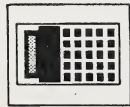
9. Compute each of the following mentally or use paper and pencil.

- a.  $(+20) - (+18)$   
b.  $(+43) - (-21)$   
c.  $(-15) - (+30)$   
d.  $(-11) - (-29)$

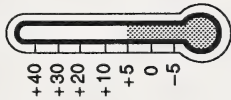
8. The diagrams showing the modelling are on page 73.

- a.  $+2$   
b.  $+8$   
c.  $-8$   
d.  $-5$
9. a.  $+2$   
b.  $+64$   
c.  $-45$   
d.  $+18$

10. Use a calculator to answer these problems.



- a. Yesterday the temperature in Barrhead was  $-12^{\circ}\text{C}$ . Today it is  $5^{\circ}\text{C}$ . How many degrees has the temperature risen?



- b. The highest spot in North America is Mt. McKinley in Alaska at 6 194 metres. The lowest is in Death Valley at  $-86$  metres. What is the difference in the heights of these two places?



10. a.

Key Press	Display
$\boxed{5}$	5
$\boxed{-}$ $\boxed{12}$	$-12$
$\boxed{=}$	17

The temperature has risen  $17^{\circ}\text{C}$ .

b.

Key Press	Display
$\boxed{6194}$	6194
$\boxed{-}$ $\boxed{86}$	$-86$
$\boxed{=}$	6280

The difference in the two heights is 6280 m.



11. Use counters and a container to find each of these products.

a.  $(+3) \times (+2)$



b.  $(+4) \times (-2)$

c.  $(-2) \times (+3)$

d.  $(-3) \times (-4)$

11. The diagrams showing the modelling are on page 74.

a.  $+6$

b.  $-8$

c.  $-6$

d.  $+12$

12. Find each of these products mentally.

a.  $(+4) \times (+5)$

b.  $(+7) \times (-3)$

c.  $(-8) \times (+4)$

d.  $(-10) \times (-6)$

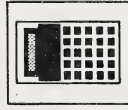
12. a.  $+20$

b.  $-21$

c.  $-32$

d.  $+60$

13. Use your calculator to find each of these products.



- a.  $(+12) \times (-16) =$
- b.  $(-48) \times (+34) =$
- c.  $(-62) \times (-49) =$
- d.  $(+19) \times (+87) =$

13. a.  $-192$

b.  $-1632$

c.  $+3038$

d.  $+1653$

14. Use counters and a container to find each of these quotients.



- a.  $(+6) \div (+2)$
- b.  $(-6) \div (+2)$
- c.  $(+6) \div (-3)$
- d.  $(-10) \div (-2)$

14. The diagrams showing the modelling are on page 75.

a.  $+3$

b.  $-3$

c.  $-2$

d.  $+5$

15. Find each of these quotients mentally or by using paper and pencil methods.

a.  $(+69) \div (+3) = \blacksquare$

15. a.  $+23$

b.  $(+74) \div (-37) = \blacksquare$

b.  $-2$

c.  $(-24) \div (+3) = \blacksquare$

c.  $-8$

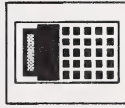
d.  $(-50) \div (-10) = \blacksquare$

d.  $+5$

16. Use your calculator to find each of these quotients.

a.  $(+117) \div (+13)$

16. a.  $9$



b.  $(-475) \div (+19)$

b.  $-25$

c.  $(+255) \div (-15)$

c.  $-17$

d.  $(-289) \div (-17)$

d.  $17$

17. Use the rules for order of operations to evaluate each of the following.

a.  $(-6) + (-2) \times (-4)$

17. a.  $+2$

b.  $(-8) + (-4) \times (-3) - (-5)$

b.  $-1$

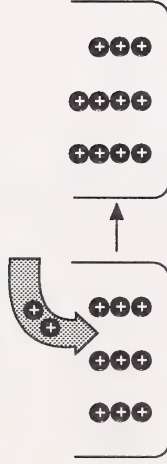
c.  $\frac{(-4) + (+2) - (-3)}{(+8) \times (-3) + (-24)}$

c.  $+1$

d.  $[(+16) - (+2) \times (-8)] + [(-3) \times (+4) + (-6)]$

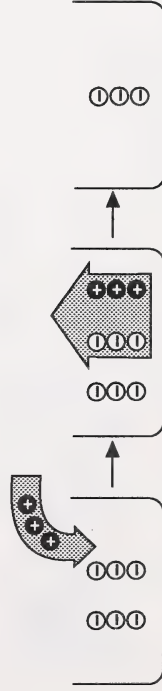
d.  $+16$

5. a.



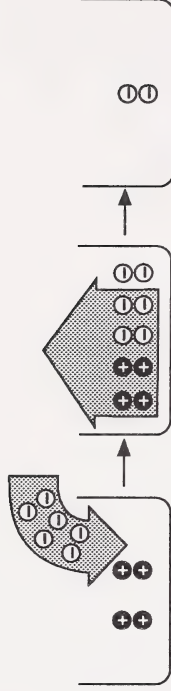
$(+9) + (+2)$  means to put 9 positive counters and then 2 positive counters into a container. The result is 11 positive counters. So,  $(+9) + (+2) = +11$ .

b.



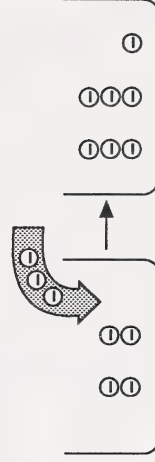
$(-6) + (-3)$  means to put 6 negative counters and then 3 positive counters into a container. After removing the zero pairs, the result is 3 negative counters. So,  $(-6) + (-3) = -3$ .

c.



$(+4) + (-6)$  means to put 4 positive counters and then 6 negative counters into a container. After removing the zero pairs, the result is 2 negative counters. So,  $(+4) + (-6) = -2$ .

d.



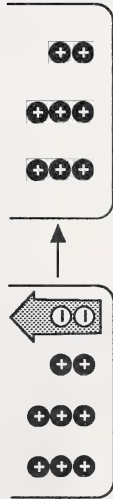
$(-4) + (-3)$  means to put 4 negative counters and then 3 negative counters into the container. The result is 7 negative counters. So,  $(-4) + (-3) = -7$ .

8. a.



$(+4) - (+2)$  means to take out 2 positive counters from a container with 4 positive counters. The result is 2 positive counters. So,  $(+4) - (+2) = +2$ .

b.



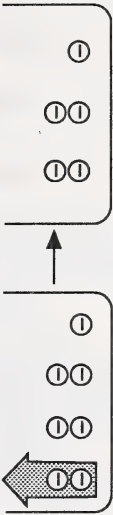
$(+6) - (-2)$  means to take out 2 negative counters from a container with 6 positive counters. The result is 8 positive counters. So,  $(+6) - (-2) = +8$ .

c.



$(-5) - (+3)$  means to take out 3 positive counters from a container with 5 negative counters. The result is 8 negative counters in the container. So,  $(-5) - (+3) = -8$ .

d.



$(-7) - (-2)$  means to take out 2 negative counters from a container with 7 negative counters. The result is 5 negative counters. So,  $(-7) - (-2) = -5$ .

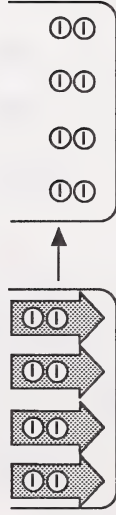


11. a.



$(+3) \times (+2)$  means to put three groups of 2 positive counters into the container. The result is 6 positive counters in the container. So,  $(+3) \times (+2) = +6$ .

b.



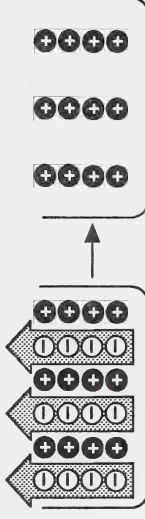
$(+4) \times (-2)$  means to put four groups of 2 negative counters into the container. The result is 8 negative counters in the container. So,  $(+4) \times (-2) = -8$ .

c.



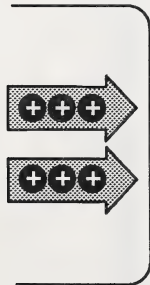
$(-2) \times (+3)$  means to take out two groups of 3 positive counters from the container. The result is 6 negative counters in the container. So,  $(-2) \times (+3) = -6$ .

d.



$(-3) \times (-4)$  means to take out three groups of four negative counters from the container. The result is 12 positive counters in the container. So,  $(-3) \times (-4) = +12$ .

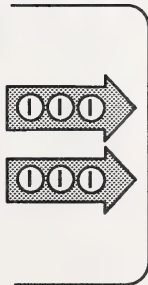
14. a.



$(+6) \div (+2)$  means to get 6 positive counters in the container, two groups of how many counters are put in the container. Two groups of 3 positive counters are put in.

So,  $(+6) \div (+2) = +3$ .

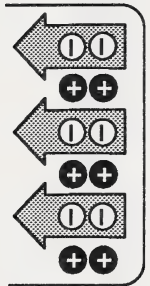
b.



$(-6) \div (+2)$  means to get 6 negative counters in the container, two groups of how many counters are put in the container. Two groups of 3 negative counters are put in.

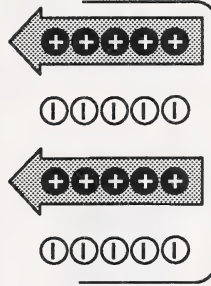
So,  $(-6) \div (+2) = -3$ .

c.



$(+6) + (-2)$  means to get 6 positive counters in the container, three groups of how many counters are taken out of the container. Three groups of 2 negative counters are taken out. So,  $(+6) + (-2) = +4$ .

d.



$(-10) + (-2)$  means to get 10 negative counters in the container, two groups of how many counters are taken out of the container. Two groups of 5 positive counters are taken out. So,  $(-10) + (-2) = -12$ .

### Guiding the Student

Help each student to decide what to do next. It is recommended that students review the notes of the section which corresponds to the questions with which the students experienced success and that the students do a few sample questions from the activities.

It is recommended that students carefully study the notes in the sections which corresponds to the questions with which the students experienced difficulty, and that the students do most of the questions in the activities.

Question	Skill	Section
1, 2	interpreting an integer	9
3, 4	comparing and ordering integers	9
5, 6, 7	adding integers	10
8, 9, 10	subtracting integers	11
11, 12, 13	multiplying integers	12
14, 15, 16	dividing integers	13

## INTEGERS

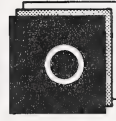
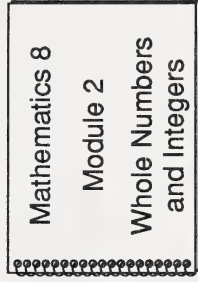
### What Lies Ahead

In this section the student will learn these skills.

- interpreting integers
- reading and writing integers
- comparing integers
- ordering integers

### Gathering Materials

For this section the student will need these items.



(optional)

Disk *Pre-Algebra D from Computer Drill and Instruction: Mathematics, Level D (SRA)*

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

**Practice Activities**

1. Write the positive or negative integer that describes each of these situations.
  - a. two floors below ground level
  - b. 6 km above the ground
  - c. five bonus points
  - d. 12 m below sea level
  - e. nine degrees above the freezing point
2. Write the opposite integer for each integer given.

- a.  $+3$
- b.  $-13$
- c.  $43$
- d.  $-1\ 001$
- e.  $-1$

**Suggested Answers**

1.
  - a.  $-2$
  - b.  $+6$
  - c.  $+5$
  - d.  $-12$
  - e.  $+9$
2.
  - a.  $-3$
  - b.  $+13$
  - c.  $-43$
  - d.  $+1\ 001$
  - e.  $+1$

3. Find the pair of opposite integers in each group.

- a.  $+17, +70, -7, -700, -17$
- b.  $403, -430, +304, -403, -433$
- c.  $3, 33, -333, -3, -3\ 333$

4. In a golf game,  $-2$  means two strokes under par. What does each of the following integers mean when expressed as a golf score?

- a.  $-6$
- b.  $2$
- c.  $0$
- d.  $14$
- e.  $-8$



- 3. a.  $-17, +17$
  - b.  $-403, 403$
  - c.  $-3, 3$
- 
- 4. a. six strokes under par
  - b. two strokes over par
  - c. no strokes under or over par
  - d. fourteen strokes over par
  - e. eight strokes under par




5. Complete each of the following number lines.




6. Use  $>$  or  $<$  to show the relationship between each pair of integers.

a. 6  16

b. -5  -3

c. -2  -20

d. -12  1

e. 4  +5



6. a.  $6 < 16$   
 b.  $-5 < -3$   
 c.  $-2 > -20$   
 d.  $-12 < 1$   
 e.  $4 < 5$

7. Arrange each group of integers in order from least to greatest.

a.  $-4, 8, -3, 12, 0$

b.  $+6, 0, -4, -8, +11, +4, -10, -5$

c.  $-1, -3, -6, +8, +13, +11, 0, -15$


7. a.  $-4, -3, 0, 8, 12$

b.  $-10, -8, -5, -4, 0, +4, +6, +11$

c.  $-15, -6, -3, -1, 0, +8, +11, +13$

**Extra Practice****Computer Alternative**

1. Do Lessons 11 and 12 on the disk *Pre-Algebra D* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the  key.

**Print Alternative**

2. Use integers to describe each of these situations.
  - a. a raise of 7%
  - b. a loss of \$40
  - c. a gain of 30 yards
  - d. four strokes below par

**Suggested Answers**

1. Computer corrected

2.
  - a.  $+7$
  - b.  $-40$
  - c.  $+30$
  - d.  $-4$

- e. 40 degrees below zero Celsius
- f. bank account withdrawal of \$50
- g. 120 m above sea level
- h. a profit of \$10 609

3. Order each of these groups of integers from least to greatest.

- a.  $-1, -2, -6, +8, +10, 0, +1$
- b.  $33, 13, 3, -3, -13, -33$
- c.  $0, 2, 4, -2, -63, 129, -10\ 468$

- e.  $-40$
  - f.  $-50$
  - g.  $+120$
  - h.  $+10\ 609$
- 3.
- a.  $-6, -2, -1, 0, +1, +8, +10$
  - b.  $-33, -13, -3, +3, +13, +33$
  - c.  $-10\ 468, -63, -2, 0, +2, +4, +129$

**Concluding Activities**

Give the absolute value of the following integers.

1.  $+5$
2.  $-5$
3.  $+7$
4.  $-7$
5.  $0$

**Suggested Answers**

1.  $|+5| = 5$
2.  $|-5| = 5$
3.  $|+7| = 7$
4.  $|-7| = 7$
5.  $|0| = 0$

## ADDING INTEGERS

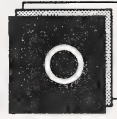
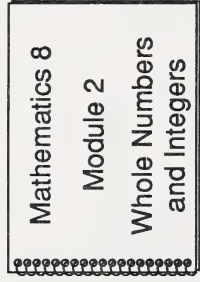
### What Lies Ahead

In this section the student will review this skill.

- adding integers using objects
- In this section the student will also learn these skills.
- adding integers without using objects
- adding integers using a calculator

### Gathering Materials

For this section the student will need these items.



(optional)

- *Computer Drill and Instruction: Mathematics, Level D (SRA)*
- *Integers/Integer Fast Facts (EduSoft)*






### Guiding the Student

- Emphasize to the students the goal of this section.
- You may wish to use the video *MATH MOVES: Integers* from ACCESS Network to demonstrate the modelling.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.



## Introductory Activities

1. Use your counters to model these sums and complete each addition number sentence.

- a.  $(+2) + (+5) =$    
 b.  $(-3) + (-6) =$    
 c.  $(-3) + (+6) =$    
 d.  $(+3) + (-4) =$    
 e.  $(-2) + (+1) =$  



2. What pattern occurs when you add counters with like signs?  
 3. What pattern occurs when you add counters with unlike signs?

## Suggested Answers

1. a.  $+7$   
 b.  $-9$   
 c.  $+3$   
 d.  $-1$   
 e.  $-1$

2. When counters with like signs are added, the number in the answer is the sum of the counters, and the answer has the same sign as the counters.  
 3. When counters with unlike signs are added, the number in the answer is the difference between the positive and negative counters, and the answer has the same sign as the surplus counters.

## Practice Activities

## Print Alternative

1. Find each of these sums mentally. Write your answer.



a.  $(+7) + (+1) =$

b.  $(-3) + (-6) =$

c.  $(-6) + 0 =$

d.  $(-4) + (+9) =$

e.  $(+2) + (-2) =$

f.  $(-6) + (+3) =$

g.  $(+11) + (-8) + (+10) =$

h.  $(-1) + (+6) + (-4) + (-2) =$

2. Solve the following word problem. Show the number sentence which you used.

The temperature at 3 o'clock was  $12^{\circ}\text{C}$ . By 9 o'clock it had fallen  $5^{\circ}\text{C}$ . What was the temperature at 9 o'clock?

## Suggested Answers

1. a.  $+8$

b.  $-9$

c.  $-6$

d.  $+5$

e.  $0$

f.  $-3$

g.  $+13$

h.  $-1$


2.  $(+12) + (-5) =$

$(+12) + (-5) = +7$

By 9 o'clock the temperature was  $7^{\circ}\text{C}$ .

**Computer Alternative**

3. Do Lesson 13 on the disk *Pre-Algebra from Computer Drill and Instruction: Mathematics, Level D* (SRA).

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the  key.

3. Computer corrected

## Extra Practice

## Suggested Answers

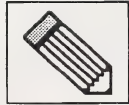
## Computer Alternative



1. Work with the program *Integers* from the disk *Integers/Integer Fast Facts* (EduSoft). Read the User's Guide supplied with the disk. Choose the addition operation.

1. Computer corrected

## Print Alternative



2. Find each of these sums mentally. Write the answer.

a.  $(-4) + 0 =$

2. a. -4

b.  $(+6) + (+3) =$

b. +9

c.  $(-5) + (+8) =$

c. +3

d.  $(-1) + (-10) =$

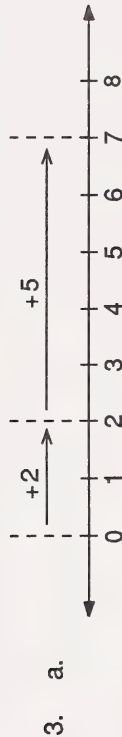
d. -11

e.  $(+12) + (-7) =$

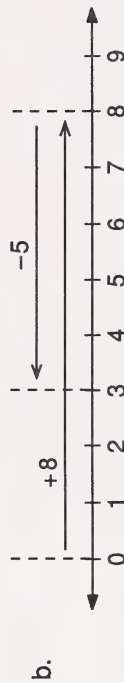
e. +5

3. Draw a number line to show each of these events.

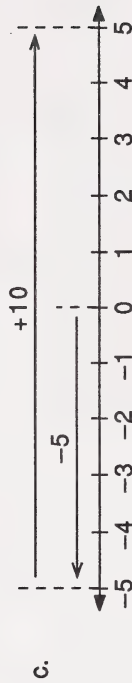
a. a growth of 2 cm followed by a growth of 5 cm



b. a temperature rise of  $8^{\circ}\text{C}$  followed by a drop of  $5^{\circ}\text{C}$



c. a withdrawal of \$5 followed by a deposit of \$10



4. Write a number sentence to describe each of the events in Question 3. Give the correct answer.

a.  $(+2) + (+5) = +7$

b.  $(+8) - (+5) = +3$

c.  $(-5) + (+10) = +5$

5. Colonel Bogey scores  $-1$  on his first round of golf and  $+4$  on the next round. What is his score after both rounds?



5.  $(-1) + (+4) = +3$

Colonel Bogey's score after both rounds is  $+3$ .

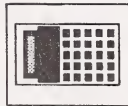
6. Felina lost six marbles in one game and then lost 10 more in another game. What was her total loss?

6.  $(-6) + (-10) = -16$

Felina lost a total of sixteen marbles.



## Concluding Activities



Use your calculator to complete the *How's Business?* puzzle<sup>1</sup> on the following page.

---

<sup>1</sup> Creative publications for excerpt from *Algebra with Pizzazz*

## How's Business?

Each person below is answering the question "How's Business?"

To decode their answers do any question at the right and find your answer in code below. Each time the answer appears in the code, write the letter of that exercise above it. Keep working until you have decoded all four responses.

I	(+10) + (-32)	W	(+54) + (-73)	O	(-50) + (+50)
B	(-15) + (+41)	J	(+83) + (-53)	Y	(+737) + (-923)
V	(-39) + (-44)	U	(-48) + (+85)	N	(-285) + (+198)
E	(-27) + (+86)	F	(-85) + (+48)	C	(-457) + (-389)
M	(+61) + (-12)	P	(-16) + (-77)	R	(+95) + (-93)
K	(-75) + (+28)	L	(+63) + (+98)	S	(-95) + (+93)
A	(-37) + (-41)	T	(-105) + (+113)	H	(+69) + (-12)
D	(-165) + (-92)				

## Soldier

Mine is

J	U	S	T		F	I	N	E		T	H	A	N	K	S	.
---	---	---	---	--	---	---	---	---	--	---	---	---	---	---	---	---

30 37 -2 8 -37 -22 -87 59 8 57 -78 -87 -47 -2

## Boxer

Mine is

A	B	O	U	T		T	O		I	M	P	R	O	V	E	.
---	---	---	---	---	--	---	---	--	---	---	---	---	---	---	---	---

-78 26 0 37 8 8 0 -22 49 -93 2 0 -83 59

## Steak Sauce Maker

Mine is

W	O	R	S	E		T	H	I	S		Y	E	A	R	.
---	---	---	---	---	--	---	---	---	---	--	---	---	---	---	---

-19 0 2 -2 59 8 57 -22 -2 -186 59 -78 2

## Math Teacher

Mine is

C	L	A	S	S	Y	.
---	---	---	---	---	---	---

-846 161 -78 -2 -2 -186



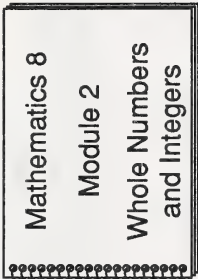
# SUBTRACTING INTEGERS

## What Lies Ahead

- In this section students will learn these skills
- subtracting integers using objects
  - subtracting integers without using objects

## Gathering Materials

For this section the student will need these items



(optional)

- *Computer Drill and Instruction: Mathematics, Level D (SRA)*
- *Integers/Integer Fast Facts (EduSoft)*

## Guiding the Student

- Emphasize to students the goal of this section.
- You may wish to use the video *MATH MOVES: Integers* from ACCESS Network. It models subtracting integers with counters.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

1. Use your counters to find the differences for each of the following cases.



- a.  $(+6) - (+3) =$  [ ]
- b.  $(-6) - (-5) =$  [ ]
- c.  $(+3) - (-3) =$  [ ]
- d.  $(-5) - (-6) =$  [ ]
- e.  $(-7) - (+4) =$  [ ]
- f.  $(+2) - (-5) =$  [ ]

2. Use your counters to model the following sums and differences.

- a.  $(+3) - (+1) =$  [ ] and  $(+3) + (-1) =$  [ ]
- b.  $(-2) - (-1) =$  [ ] and  $(-2) + (+1) =$  [ ]
- c.  $(+3) - (-2) =$  [ ] and  $(+3) + (+2) =$  [ ]

3. What did you notice about the sums and differences in Question 2?

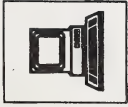
## Suggested Answers

1.
  - a.  $+3$
  - b.  $-1$
  - c.  $+6$
  - d.  $+1$
  - e.  $-11$
  - f.  $+7$
2.
  - a.  $(+3) - (+1) = +2$   
 $(+3) + (-1) = +2$
  - b.  $(-2) - (-1) = -1$   
 $(-2) + (+1) = -1$
  - c.  $(+3) - (-2) = +5$   
 $(+3) + (+2) = +5$

3. The sums and differences in Question 2 are the same. Notice that subtracting an integer is the same as adding the opposite of that integer.

# Practice Activities

## Computer Alternative



1. Do Lesson 14 on the disk *Pre-Algebra* from the package *Computer Drill and Instruction: Mathematics, Level D (SRA)*.

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the ? key.

## Print Alternative



2. Fill in the missing integer in each of these cases.

- a.  $(+4) - (+4) = (+4) + \boxed{\phantom{00}}$
- b.  $(+7) - (-12) = (+7) + \boxed{\phantom{00}}$
- c.  $(-6) - (-8) = (-6) + \boxed{\phantom{00}}$
- d.  $(-3) - (-9) = (-3) + \boxed{\phantom{00}}$
- e.  $(-5) - (+6) = (-5) + \boxed{\phantom{00}}$

# Suggested Answers

1. Computer corrected
2.
  - a.  $(+4) - (+4) = (+4) + (-4)$
  - b.  $(+7) - (-12) = (+7) + (+12)$
  - c.  $(-6) - (-8) = (-6) + (+8)$
  - d.  $(-3) - (-9) = (-3) + (+9)$
  - e.  $(-5) - (+6) = (-5) + (-6)$



3. Find the difference in each of the following questions.

a.  $(-40) - (+40) = \blacksquare$

b.  $(-17) - (-12) = \blacksquare$

c.  $(+20) - (+8) = \blacksquare$

d.  $(+13) - 0 = \blacksquare$

e.  $(+4) - (+6) = \blacksquare$

3. a.  $-80$

b.  $-5$

c.  $+12$

d.  $+13$

e.  $-2$

4. Solve the following word problem. Use a number sentence to find the answer.

A golfer's score went from  $-1$  at the end of the first round to  $+11$  at the end of the tournament. By how many strokes did his score change?



4.  $(+11) - (-1) = +12$   
His score changed by 12 strokes.

**Extra Practice**

1. For each of these integers give the additive inverse.

a.  $-7$

b.  $+2$

c.  $+10$

d.  $-178$

e.  $-7\,000$

2. Rewrite each of the following using the **opposite operation** and the additive inverse. Then find the answer.

a.  $(-6) - (+3) = \blacksquare$

b.  $(+5) - (+6) = \blacksquare$

c.  $(-2) - (-4) = \blacksquare$

d.  $(+12) - (-6) = \blacksquare$

**Suggested Answers**

1. a.  $+7$

b.  $-2$

c.  $-10$

d.  $+178$

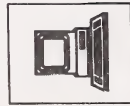
e.  $+7000$

2. a.  $(-6) + (-3) = -9$

b.  $(+5) + (-6) = -1$

c.  $(-2) + (+4) = +2$

d.  $(+12) + (+6) = +18$

**Computer Alternative**

3. Use the program *Integers from the disk Integers/Integer Fast Facts* (EduSoft).  
Read the User's Guide supplied with the disk.  
Choose the subtraction option.

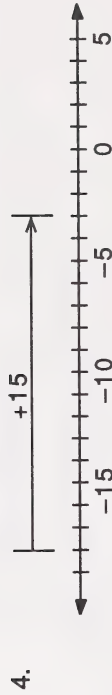
3. Computer corrected

**Print Alternative**

Use number lines to help you solve Questions 4 to 6.

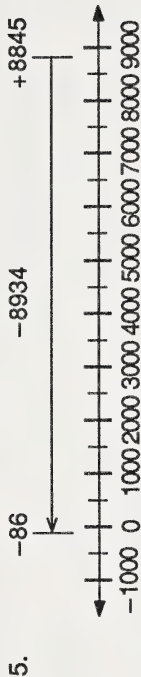


4. A chinook in southern Alberta raised the temperature from  $-18^{\circ}\text{C}$  to  $-3^{\circ}\text{C}$ . By how much did the temperature change?



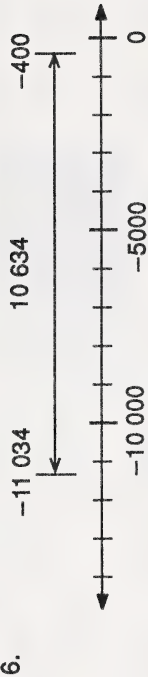
The temperature changed by  $+15^{\circ}\text{C}$ .

5. The peak of Mt. Everest is + 8 848 m or 8 848 m above sea level. The floor of Death Valley is 8 934 m lower than the peak of Mt. Everest. What is the elevation of the floor of Death Valley?



The elevation of the floor of Death Valley is - 86 m.

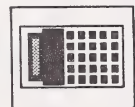
6. The Pacific Ocean floor is - 11 034 m or 11 034 m below sea level. The Dead Sea floor is - 400 m or 400 m below sea level. What is the difference between their elevations?



The difference between the elevation of the Pacific Ocean floor and the Dead Sea floor is 10 634 m.

### Concluding Activities

Use your calculator to solve Questions 1 to 3.



1. The deepest spot in the world is Challenger Deep in the Mariana Trench off the Asian coast. It is 11 033 m below sea level. The highest spot is Mt. Everest in Nepal. It is 8 848 m in height. How far apart are the two spots vertically?
2. The highest ever recorded temperature on Earth is 58°C. The lowest ever is -89°C. What is the difference between the highest and lowest temperatures recorded on Earth?
3. Complete the puzzle on the following page.

### Suggested Answers

1.	Key Press	Display
	<div>8848</div>	<div>8848</div>
	<div>-11033</div>	<div>-11033</div>
	<div>=</div>	<div>19881</div>

Challenger Deep and Mt. Everest are 19 881 m apart vertically.

2.	Key Press	Display
	<div>58</div>	<div>58</div>
	<div>-89</div>	<div>-89</div>
	<div>=</div>	<div>147</div>

The difference between the highest and lowest temperatures is 147°C.

What Do Vampires Do on Halloween?

To answer this question, follow these directions.

Draw a straight line connecting each exercise with its correct answer. Each line will cross a number and a letter. The number tells you where to put the letter in the row of boxes at the bottom of the page.

(+ 15) - (- 6)

(- 15) - (+ 6)

(- 15) - (- 6)

(+ 15) - (+ 6)

(- 83) - (+ 30)

(- 83) - (- 30)

(+ 30) - (- 83)

(- 30) - (- 83)

(+ 27) - (+ 54)

(- 78) - (- 78)

(+ 60) - (- 60)

(- 47) - (+ 77)

(- 47) - (- 77)

(+ 19) - (+ 43)

(- 36) - (- 18)

(+ 55) - (- 40)

(- 40) - (+ 55)

(+ 40) - (+ 55)

3

13

Y

10

18

A

T

6

N

C

A

8

2

15

7

N

11

E

I

R

9

A

1

9

A

17

12

B

D

4

D

S

14

- 9

- 113

- 53

120

21

53

- 24

0

- 21

95

113

- 95

- 124

9

- 27

30

- 15

- 18

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	A	T	D	R	I	N	K	A	N	D	B	E	S	C	A	R	Y





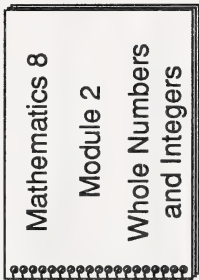
## MULTIPLYING INTEGERS

### What Lies Ahead

In this section the student will learn to multiply integers with and without objects.

### Gathering Materials

For this section the student will need these items.



*Computer Drill and Instruction:  
Mathematics, Level D (SRA)*

(optional)

### Guiding the Student

- Emphasize to students the goal of this section.
- You may wish to use the video *MATH MOVES: Integers* to demonstrate modelling.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

1. Use counters to model the following products. Write a number sentence which shows the answer.



- a.  $(+2) \times (+4)$
- b.  $(+3) \times (-3)$
- c.  $(-2) \times (-4)$
- d.  $(-3) \times (+1)$

2. Use counters to model the following and find a pattern. Watch the signs.



- a.  $(+3) \times (+1)$
- b.  $(+2) \times (-4)$
- c.  $(+1) \times (+2)$
- d.  $(-1) \times (-4)$
- e.  $(-2) \times (-1)$
- f.  $(-3) \times (+2)$

3. What do you notice about the product of two factors with like signs?
4. What do you notice about the product of two factors with unlike signs?

## Suggested Answers

1.
  - a.  $+8$
  - b.  $-9$
  - c.  $+8$
  - d.  $-3$

2.
  - a.  $+3$
  - b.  $-8$
  - c.  $+2$
  - d.  $+4$
  - e.  $+2$
  - f.  $-6$


3. The product of two factors with like signs is always positive.
4. The product of two factors with unlike signs is always negative.

## Practice Activities

### Computer Alternative



1. Do lesson 15 of the disk "Pre-Algebra" from the package, *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Read the instructions in the folder with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the  key.

## Suggested Answers

1. Computer corrected

## Print Alternative



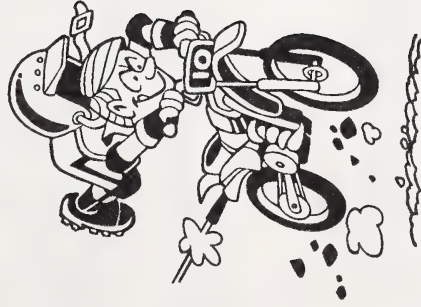
2. Tell which products will be positive and why.

- a.  $(-1) \times (+3)$
  - b.  $(-4) \times (-4)$
  - c.  $(+5) \times (-2)$
  - d.  $(+8) \times 0$
  - e.  $(+2) \times (-6)$
  - f.  $(+3) \times (+9)$
  - g.  $(-7) \times (+5)$
  - h.  $(-4) \times (-10)$
2. a. Negative. Integers have unlike signs.  
b. Positive. Integers have like signs.  
c. Negative. Integers have unlike signs.  
d. 0  
e. Negative. Integers have unlike signs.  
f. Positive. Integers have like signs.  
g. Negative. Integers have unlike signs.  
h. Positive. Integers have like signs.

3. Find the products for questions 2 above.

3. a.  $-3$   
b.  $+16$   
c.  $-10$   
d.  $0$   
e.  $-12$   
f.  $+27$   
g.  $-35$   
h.  $+40$

4. In one week, 5 drivers in Hooterville each had 3 demerit points or +3 charged to their licences. What was the total demerits for the week?
5. In a motorcross meet, Kim was charged with 7 penalty points or  $-7$  in each of the 2 races he ran. What was his total penalty?



4.  $(+5) \times (+3) = +15$

The total number of demerits for the week is 15.

5.  $(+2) \times (-7) = -14$

Kim's total penalty was 14 points.



**Extra Practice****Computer Alternative**

1. Use the program "Integers" from the disk *Integers/Integer Fast Facts* (EduSoft).

Read the User's Guide. Choose the multiplication operation.

**Print Alternative**

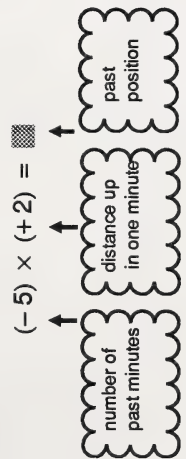
Use number lines to help you solve questions 2 - 4.

**Suggested Answers**

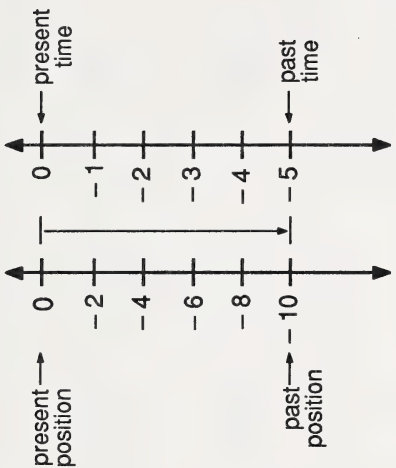
1. Computer corrected

2. Michael's present position is 0 m and he is moving up. If he climbs 2 m in one minute, what was his position five minutes ago?

Here is a number sentence describing the event.



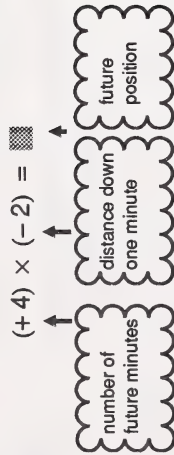
Draw a number line for the event and solve the problem using mental calculation.



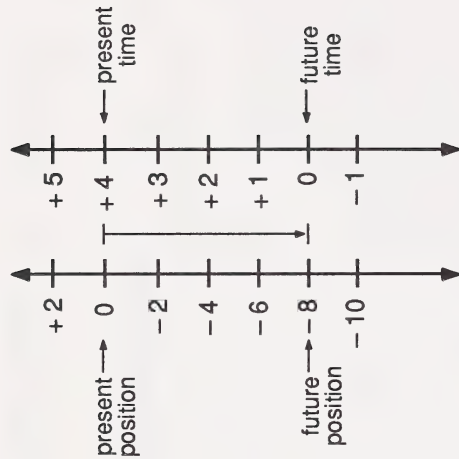
Five minutes ago Michael's position was  $-10$  m.

3. Michael's present position is 0 m and he is moving down the cliff. If he moves 2 m in one minute, what will his position be in four minutes?

Number sentence for the event.



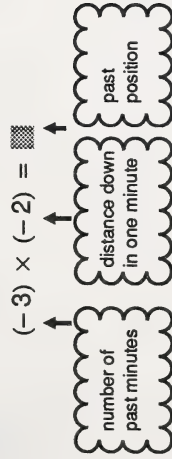
Draw a number line for the event, and solve the problem using mental calculation.



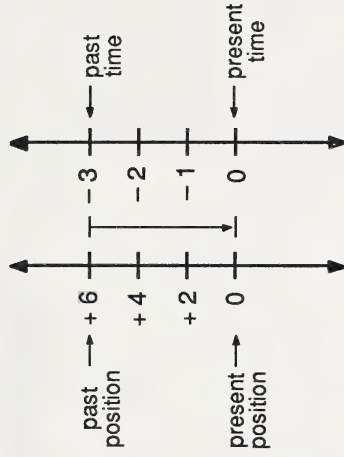
In four minutes Michael's position will be  $-8$  m.

4. Michael's present position is 0 m and he is moving down the cliff. If he moves 2 m in one minute, what was his position three minutes ago?

The number sentence:



Draw a number line for the event, and solve the problem using mental calculation.



Three minutes ago Michael's position was + 6 m.

**Further Practice**

Find the product. Use the cut out of Droopy from the appendix and number lines to help you if you like.

1.  $(-9) \times (+3) = \boxed{\phantom{00}}$

2.  $(+1) \times (+12) = \boxed{\phantom{00}}$

3.  $(+6) \times (-6) = \boxed{\phantom{00}}$

4.  $0 \times (+8) = \boxed{\phantom{00}}$

5.  $(-7) \times (-3) = \boxed{\phantom{00}}$

6.  $(+5) \times (-9) = \boxed{\phantom{00}}$

**Suggested Answers**

1.  $-27$

2.  $+12$

3.  $-36$

4.  $0$

5.  $+21$

6.  $-45$

## Concluding Activities

1. Find the products for each of the following using a calculator.



- $(+3) \times (+4) = \blacksquare$
- $(-4) \times (+2) = \blacksquare$
- $(-5) \times (-3) = \blacksquare$
- $(+4) \times (+3) \times (-2) = \blacksquare$
- $(+4) \times (-3) \times (-2) = \blacksquare$
- $(-4) \times (-3) \times (-2) = \blacksquare$
- $(-4) \times (-3) \times (-2) \times (-1) = \blacksquare$

2. What patterns do you notice in question 1?

- When there are all positive signs, what sign goes with the answer?
- When there is an even number of negative signs, what sign goes with the answer?
- When there is an odd number of negative signs, what sign goes with the answer?

## Suggested Answers

- $+12$
  - $-8$
  - $+15$
  - $-24$
  - $+24$
  - $-24$
  - $+24$

- A positive sign goes with the answer when all signs are positive.
  - A positive sign goes with the answer when there is an even number of negative signs.
  - A negative sign goes with the answer when there is an odd number of negative signs.



3. Write **P** if the answer will be positive and **N** if the answer will be negative.

a.  $(-4) \times (+2) \times (+9)$

3. a. N

b.  $(+4) \times (+2) \times (+3)$

b. P

c.  $(-1) \times (-6) \times (+4)$

c. P

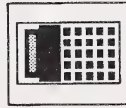
d.  $(-5) \times (-2) \times (-6)$

d. N

e.  $(+2) \times (-3) \times (+5) \times (-2)$

e. P

Use a calculator for Questions 4 and 5.



4. Find the answers to question 3.

4. a. -72

5. Complete the puzzle on the next page<sup>1</sup>.

b. +24

c. +24

d. -60

e. +60

<sup>1</sup> Creative Publications for excerpts from *Algebra with Pizzaz*.

# Hidden Message

First, do each exercise at the right and find your answer in the rectangle below. The correct answers run across from left to right. These answers may take up any number of boxes in a row.

1  $(-48) \times (-17)$

2  $(+39) \times (-68)$

3  $(-8) \times (+4) \times (-7)$

4  $(-6) \times (+1589)$

5  $(-15) \times (-25) \times (-35)$

6  $(-100) \times (+9) \times (+53)$

7  $(-3) \times (+8) \times (-9) \times (-7)$

8  $(-94) \times (-1) \times (+78) \times (+20)$

9  $(-8) \times (-8) \times (-8) \times (-8)$

10  $(-498) \times (+10) \times (+20) \times (+30)$

11  $(-3) \times (-3) \times (-3) \times (-3) \times (-3)$

Second, shade in the boxes containing each right answer. When you finish, there will be 27 boxes not shaded in.

Starting on the top line and working from left to right, print the 27 letters that remain into the boxes at the bottom of the page. A hidden message will appear!

J -1	U 8	M 1	A 6	O 4	M -2	I 9	S 8	P 8	T 0	H 0	O 0	G 3	G 9	A -1	M 5	E 1	A 2	E -1	R 7	O 2	B 2	A 4	S 0	D 7
O -9	B 3	E 6	Y -2	L 6	I 5	A 2	T 4	T -1	E 0	N -1	T 3	I 1	O 2	N 5	R -8	O -2	L 4	E 3	I 4	N 4	G 0	O 9	O 6	N 7
T -3	H 2	A -9	T 5	O 3	T 4	E 9	L 4	O -3	P 1	H 4	Q 6	U 6	B 4	O 0	N 5	G -6	R 0	E -4	A 7	T 7	A 0	S 0	U 4	N 3

J	O	G	G	E	R	S	D	O	B	E	T	T	E	R	I	N	T	H	E	L	O	N	G	R	U	N
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---



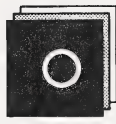
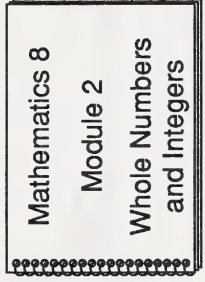
# DIVIDING INTEGERS

## What Lies Ahead

- In this section the student will learn these skills.
- dividing integers using objects
  - dividing integers without using objects

## Gathering Materials

For this section the student will need these items.



- *Computer Drill and Instruction: Mathematics, Level D (SRA)*
  - *Integers/Integer Fast Facts (EduSoft)*
- (optional)





## Guiding the Student

- Emphasize the goal of this section.
- You may wish to use the video *MATH MOVES: Integers* to demonstrate the modelling.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities







1. Use counters to model the following and find the result.



- a.  $(+6) + (+3) =$    
 b.  $(+12) + (-3) =$    
 c.  $(-8) + (+4) =$    
 d.  $(-8) + (-2) =$  

2. Use counters to model the following and find a pattern.  
 Watch the signs.



- a.  $(+4) + (+2) =$    
 b.  $(+6) + (-3) =$    
 c.  $(-2) + (+2) =$    
 d.  $(-8) + (-4) =$    
 e.  $(+9) + (-3) =$    
 f.  $(-3) + (-1) =$  

3. What do you notice about the quotient of two numbers with like signs?
4. What do you notice about the quotient of two numbers with unlike signs?

## Suggested Answers

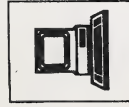
1. a.  $+2$   
 b.  $-4$   
 c.  $-2$   
 d.  $+4$
2. a.  $+2$   
 b.  $-2$   
 c.  $-1$   
 d.  $+2$   
 e.  $-3$   
 f.  $+3$

3. The quotient of two numbers with like signs is always positive.
4. The quotient of two numbers with unlike signs is always negative.



## Practice Activities

## Computer Alternative



1. Do Lesson 16 on the disk *Pre-Algebra* from the package *Computer Drill and Instruction: Mathematics, Level D (SRA)*.

Read the instructions included with the disk before using the program. If you need help, remember to hold down the SHIFT key and press the ? key.

## Suggested Answers

1. Computer corrected

## Print Alternative



2. Provide the correct sign to make each number sentence true. Why did you choose the sign that you used?

a.  $(+ 56) \div (+ 7) = \boxed{8}$

b.  $(- 121) \div (- 11) = \boxed{11}$

c.  $(+ 1272) \div (- 24) = \boxed{-53}$

d.  $(- 7259) \div (+ 119) = \boxed{-61}$

2. a.  $+ 8$ . The integers have like signs.

b.  $+ 11$ . The integers have like signs.

c.  $- 53$ . The integers have unlike signs.

d.  $- 61$ . The integers have unlike signs.



3. Fill in the missing number in each of the following.

- $\square \div (-3) = -9$
- $(+36) \div (-4) = \square$
- $(-22) \div \square = +11$
- $(-48) \div \square = -8$
- $(+24) \div (-6) = \square$

4. Find the quotient for each of the following.

- $(+70) \div (-10) = \square$
- $(-36) \div (+12) = \square$
- $(-48) \div (-6) = \square$
- $(+18) \div (+3) = \square$
- $(+35) \div (-7) = \square$

5. Solve this word problem by using a number sentence.

A diver descends from the surface to a depth of  $-100$  m in five minutes. How many metres did the diver descend in one minute?

- $+27$
  - $-9$
  - $-2$
  - $+6$
  - $-4$
- $-7$
  - $-3$
  - $+8$
  - $+6$
  - $-5$
- $(-100) \div (+5) = (-20)$

The driver descended  $-20$  m in one minute.

# Extra Practice

# Suggested Answers

## Computer Alternative



1. Use the program *Integers* from the disk *Integers/Integer Fast Facts* (EduSoft).

Read the User's Guide. Choose the multiplication operation.

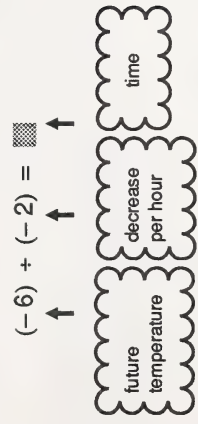
## Print Alternative

Use number lines to help you complete Questions 2 and 3.

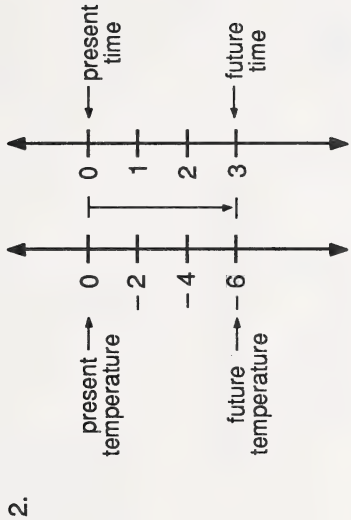


2. The present temperature is  $0^{\circ}\text{C}$ . If the temperature is falling  $2^{\circ}\text{C}$  each hour, how long will it take to reach  $-6^{\circ}\text{C}$ ?

The number sentence describing the event is this.



1. Computer corrected

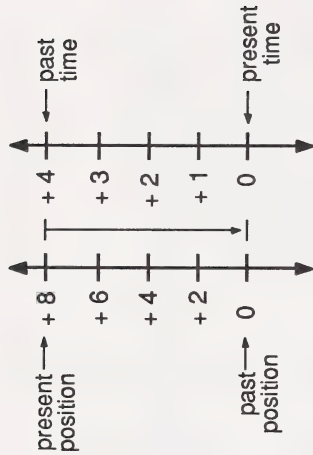


It will take three hours for the temperature to reach  $-6^{\circ}\text{C}$ .

3. The present temperature is  $0^{\circ}\text{C}$ . If the temperature is falling  $2^{\circ}\text{C}$  each hour, how long ago was it  $+8^{\circ}\text{C}$ ?

The number sentence describing the event is this.

$$(+8) \div (-2) = \boxed{\phantom{00}}$$



It was  $8^{\circ}\text{C}$  four hours ago.

**Further Practice**

Find the quotient. If you wish, use the cutout of Droopy and the number lines to help you.

1.  $(+8) \div (+4) = \boxed{\phantom{00}}$

2.  $(+8) \div (-4) = \boxed{\phantom{00}}$

3.  $(-8) \div (+4) = \boxed{\phantom{00}}$

4.  $(-8) \div (-4) = \boxed{\phantom{00}}$

5.  $(+15) \div (-5) = \boxed{\phantom{00}}$

6.  $(-9) \div (-3) = \boxed{\phantom{00}}$

7.  $(-16) \div (+4) = \boxed{\phantom{00}}$

**Suggested Answers**

1.  $+2$

2.  $-2$

3.  $-2$

4.  $+2$

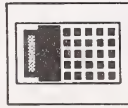
5.  $-3$

6.  $+3$

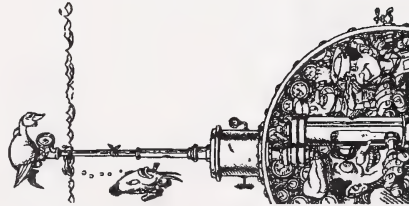
7.  $-4$

## Concluding Activities

Use your calculator to complete Questions 1 and 2.



1. A submarine descends 30 m every minute.  
How long will it take to descend from sea level to  $-1\,800$  m?



## Suggested Answers

$$(-1800) \div (-30) = +60$$

1. It will take 60 minutes to descend to  $-1800$  m.

2. Complete the following puzzle.<sup>1</sup>

<sup>1</sup> Creative Publications for excerpts from *Algebra with Pizzaz*.

# **What Did ZORNA Say When She Married a 3-foot Pygmy?**

Do each of the exercises to the right and find your answer in one of the boxes at the bottom of the page. Write the letter of the exercise in that box. The answers are arranged in order from smallest to largest. Keep working and you will discover the answer to the title question.

A	$(-12) + (+4)$	A	$(+750) + (+10)$	E	$\frac{(+36)}{(-2)}$	N	$\frac{(+38)}{(-19)}$
E	$(+60) + (+15)$	E	$(-42) + (-7)$	O	$\frac{(-50)}{(-2)}$	V	$\frac{(-63)}{(+3)}$
T	$(+45) + (-9)$	R	$(-150) + (+2)$	A	$\frac{(+100)}{(-4)}$	T	$\frac{(+300)}{(-2)}$
A	$(-48) + (-4)$	E	$(-100) + (-2)$	D	$\frac{(-670)}{(-10)}$	H	$\frac{(+1000)}{(+100)}$
R	$(-49) + (-7)$	T	$(+67) + (-1)$	E	$\frac{(+9100)}{(-100)}$	B	$\frac{(+3110)}{(-10)}$
A	$(-3) + (-3)$	N	$(-80) + (-40)$	O	$\frac{(+45)}{(-3)}$	N	$\frac{(+900)}{(+300)}$
E	$(-60) + (+5)$	H	$(+150) + (-5)$	A	$\frac{(+600)}{(+4)}$	S	$\frac{(+81)}{(-9)}$
O	$(-200) + (+4)$	R	$(-30) + (+5)$	V	$\frac{(+39)}{(+3)}$	L	$\frac{(-430)}{(-2)}$
A	$(-90) + (+9)$	T	$(+1700) + (-10)$	O	$\frac{(-54)}{(-6)}$	H	$\frac{(-48)}{(+6)}$
H	$0 + (-7)$	V	$(+100) + (+20)$	L	$\frac{(+311)}{(+1)}$	L	$\frac{(-48)}{(+3)}$
D	$(+77) + (-7)$	T	$(+13) + (-13)$				
E	$(-215) + (+1)$	V	$(+120) + (+4)$				
T	$(+96) + (+12)$	M	$(-100) + (+25)$				
E	$(-75) + (-5)$	V	$(-42) + (+3)$				
O	$(+56) + (-8)$	L	$(+80) + (+5)$				

-311 B	-215 E	-170 T	-150 T	-91 E	-75 R	-67 T	-50 O	-30 H	-25 A	-21 V	-18 E	-16 L	-15 O	-14 V	-12 E	-11 D	-10 A
-9 S	-8 H	-7 O	-6 R	-5 T	-4 M	-3 A	-2 N	-1 T	0 H	1 A	2 N	3 N	4 E	5 V	6 E	7 R	
8 T	9 O	10 H	12 A	13 V	15 E	16 L	25 O	30 V	50 E	67 D	75 A	91 T	150 A	215 L	311 L		





## ORDER OF OPERATIONS

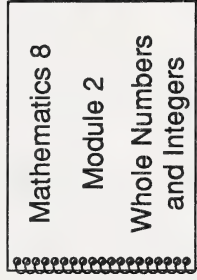
### What Lies Ahead

In this section the student will learn these skills.

- identifying the correct order of operations for integers
- using order of operations correctly when calculating with integers

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the student the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Suggested Answers

## Practice Activities

1. Simplify each of the following.

a.  $(-2) \times (+3) - (-2)$

b.  $(+7) - (+8) \times (-3)$

c.  $(-4) - (+4) \div (-2)$

d.  $(+9) \div (-3) + (+5) \times (-2) - (+1)$

2. Simplify each of the following.

a.  $(-4) \times (-3) \div [(+2) + (+2)]$

b.  $[(+6) - (-4)] \times (-12) \div (-6)$

c.  $(-3) \times (+5) - [(-42) \div (+7) - (-3)]$

d.  $[(+13) \div (-11)] - (+1) \times (-4) + [(+19) \times (+23)]$

e.  $(+99) - [(+4) \div (-10) \div (+5) \times (-8)]$

1. a.  $(-6) - (-2) = -4$

b.  $(+7) - (-24) = +31$

c.  $(-4) - (-2) = -2$

d.  $(-3) + (-10) - (+1) = -14$

2. a.  $(-4) \times (-3) \div (+4) = (+12) \div (+4) = +3$

b.  $(+10) \times (-12) \div (-6) = +20$

c.  $(-3) \times (+5) - (-3)$   
 $= (-15) - (-3)$   
 $= -12$

d.  $(+2) - (+1) \times (-4) + (+437)$   
 $= (+2) - (-4) + (+437)$   
 $= +443$

e.  $(+99) - [(+4) + (-2) \times (-8)]$   
 $= (+99) - [(+4) + (-2) \times (-8)]$   
 $= (+99) - (+20)$   
 $= +79$

3. Sanchez likes golf. Over one season he played 200 games. In 85 games he was three under par or  $-3$ . In 60 games he was one under par or  $-1$ . In 30 games he was two over par or  $+2$ , and in 25 games he was three over par or  $+3$ . Calculate how much over or under par he was for the 200 games played in one season.



$$\begin{aligned}
 3. \quad & [(+85) \times (-3)] + [(+60) \times (-1)] + [(+30) \times (+2)] + \\
 & [(+25) \times (+3)] \\
 & = (-255) + (-60) + (+60) + (+75) \\
 & = -180
 \end{aligned}$$

Sanchez was 180 under par for the season.

**Extra Practice**

1. Simplify each of the following.

a.  $(+3) - (-4) + (-2)$

b.  $(-2) \times (-6) \times (-3)$

c.  $(+4) + (-2) \times (-5)$

d.  $(+14) + (-2) + (+6) \times (-3)$

2. Simplify each of the following.

a.  $[(-4) + (-2)] - [(-6) \times (+3)]$

b.  $(+3) - [(-2) - (-4)]$

c.  $(+2) \times [(+1) + (-5)] + (-4)$

d.  $[(-18) + (-9) \times (+4)] - [(+14) - (+4)] + (-2)$

**Suggested Answers**

1. a.  $+5$

b.  $-36$

c.  $(+4) + (+10) = +14$

d.  $(-7) + (-18) = -25$

2. a.  $(-6) - (-18) = +12$

b.  $(+3) - (+2) = (+1)$

c.  $(+2) \times (-4) + (-4) = +2$

d.  $(+8) - (+10) + (-2)$   
 $= (+8) - (-5)$   
 $= +13$

3. Sasha had several types of stocks. At the end of the year she had to calculate her total profit or loss on the stocks. The table below shows the number of shares in each stock and the profit or loss per share.

Name	Number of Shares	Profit (+) or Loss (-) on Each Share
Happy Helicopters	50	+ 2
Duggit Mines	75	- 3
Black Earth Petroleum	100	+ 1
New Wave Hair Salons	125	- 4

Calculate Sasha's total profit or loss for the year.

3. 
$$\begin{aligned} & [(+50) \times (+2)] + [(+75) \times (-3)] + [(+100) \times (+1)] + \\ & [(+125) \times (-4)] \\ & = (+100) + (-225) + (+100) + (-500) \\ & = -525 \end{aligned}$$

Sasha had a loss of 525 for the year.



**Concluding Activities**


1. Evaluate the following on paper first. Then use your calculator to see if you can get the same result. Remember to clear the calculator display before computing. Press **C** to clear the display.

- a.  $49 + 200 \div 25$
- b.  $12 - 18 \div 9 + 4$
- c.  $(+41) + (-512) \div (-16)$
- d.  $(-28) + (+4) + (-2) - (-32)$

**Suggested Answers**

1. a. 57  
b. 14  
c. 73  
d. 2



2. Evaluate the following on paper first. Then use your calculator to see if you get the same result. Remember to clear the memory after each question by pressing .

a.  $18 + 72 \div 6 + 24$

b.  $17 \times 11 + 5 \times 18$

c.  $(-2) + (+8) \times (-3)$

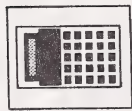
d.  $(-5) - (+7) \times (-2)$

2. a.  $+54$

b.  $+277$

c.  $-26$

d.  $+9$



3. Evaluate the following on paper first. Then use your calculator to see if you can get the same result. Remember to clear the memory after each question by pressing **MC**.

a.  $5 + 3 \times (9 - 2)$

b.  $(3 + 5 - 2) \div 6$

c.  $[(-150) + (+6)] \div 12$

d.  $(+13) + [(-2) + (-10)]$

3. a.  $+26$

b.  $+1$

c.  $-12$

d.  $+1$

## SUMMARY

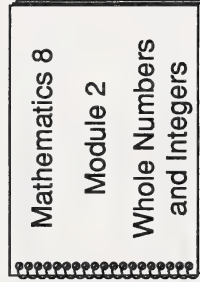
### What Lies Ahead

In this section the student will review these skills.

- adding, subtracting, multiplying, and dividing integers
- performing a series of operations

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students the goal of this section is to review Part Two.
- Help the students check their new answers to the pretest in Section 8.



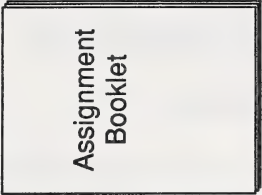
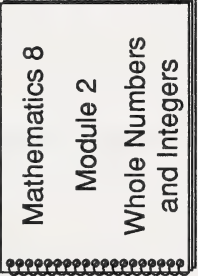
## MODULE CONCLUSION

### What Lies Ahead

The student is now ready to do the assignment in the assignment booklet. The student will be graded on the work done in this booklet.

### Gathering Materials

The student will need the following items.



### Guiding the Student

- Emphasize to the students that assignment should be done independently.
- Provide the students with a grade and feedback to the assignment.



50

**Suggested Answers to Assignment Booklet****Part 1: Multiple-Choice Questions**

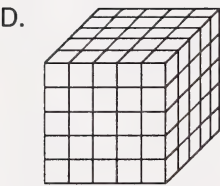
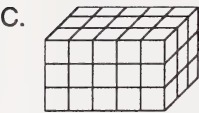
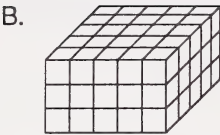
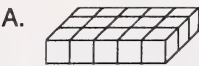
Each of the following questions has four suggested answers, one of which is better than the others. Place the letter of the best answer in the blank on the response page at the right.

1. Which number is the least prime number?
  - A. 3
  - B. 2
  - C. 1
  - D. 0
2. Which of the following is the prime factorization of 48?
  - A.  $2 \times 2 \times 2 \times 2 \times 3$
  - B.  $2 \times 2 \times 2 \times 3$
  - C.  $2 \times 2 \times 3 \times 4$
  - D.  $2 \times 2 \times 2 \times 3 \times 3$
3. Which number is **not** a factor of 36?
  - A. 6
  - B. 9
  - C. 8
  - D. 18
4. Which group is **not** made up entirely of multiples?
  - A. 7, 14, 22, 28
  - B. 5, 10, 15, 20
  - C. 11, 22, 33, 44
  - D. 9, 18, 27, 36

**Part 1 Response Page**1.     B    2.     A    3.     C    4.     A

Part 1 (continued)

5. Which diagram represents  $5^3$ ?



6. Which number is expressed in scientific notation?

- A.  $11.3 \times 10^6$
- B.  $1.9 \times 10^5$
- C.  $2.35 \times 5^{10}$
- D.  $0.13 \times 10^3$

**Part 1 Response Page (continued)**5.     D    6.     B

**Part 1 (continued)**

7. Which number is the additive inverse of  $-4$ ?
- A.  $+8$
  - B.  $-8$
  - C.  $-2$
  - D.  $+4$
8. Which number is the least in value?
- A.  $-4$
  - B.  $0$
  - C.  $-2$
  - D.  $+4$
9. Which number is the greatest in value?
- A.  $-8$
  - B.  $0$
  - C.  $-4$
  - D.  $-2$
10. What does the display **1.5 8** on a scientific calculator mean?
- A.  $1.58$
  - B.  $1.5 \times 8$
  - C.  $1.5 \times 8^{10}$
  - D.  $1.5 \times 10^8$

**Part 1 Response Page (continued)**7.     D    8.     A    9.     B    10.    D



**Part 1 (continued)**

11. Which list shows numbers arranged in order from least to greatest?

- A.  $-8, -5, 0, +3$
- B.  $-1, -3, -5, -8$
- C.  $+3, -4, +5, -6$
- D.  $+2, -2, +1, -1$

12. Which number is a composite number?

- A. 111
- B. 211
- C. 311
- D. 511

13. Which number is the least common multiple of 30 and 45?

- A. 5
- B. 6
- C. 15
- D. 90

14. Which power equals 64?

- A.  $32^2$
- B.  $2^8$
- C.  $8^2$
- D.  $8^8$

15. What is the number 3 in  $3^5$  called?

- A. exponent
- B. power
- C. base
- D. expanded notation

**Part 1 Response Page (continued)**11.     A    12.     A    13.     D    14.     C    15.     B

**Part 1 (continued)**

16. Which number is the standard form of  $5^{10}$ ?

- A. 1 953 125
- B. 50 000 000 000
- C. 48 828 125
- D. 9 765 625

17. Which number is the value of  $(-2) + (-4)$ ?

- A. +2
- B. -2
- C. +6
- D. -6

18. Which number is the value of  $(+2) + (+5)$ ?

- A. -7
- B. +7
- C. +3
- D. -3

19. Which number is the value of  $(-3) - (-4)$ ?

- A. +1
- B. +7
- C. -7
- D. -1

20. Which number is the value of  $(+5) - (-2)$ ?

- A. +3
- B. -3
- C. +7
- D. -7

**Part 1 Response Page (continued)**16.     D    17.     D    18.     B    19.     A    20.     C

**Part 1 (continued)**

21. Which number is the value of  $(-3) \times (+5)$ ?

- A. + 15
- B. - 15
- C. + 2
- D. - 2

22. Which number is the value of  $(-7) \times (-3)$ ?

- A. - 4
- B. + 4
- C. - 21
- D. + 21

23. Which number is the value of  $(-54) \div (+6)$ ?

- A. + 8
- B. - 8
- C. + 9
- D. - 9

24. Which number is the value of  $(-65) \div (-13)$ ?

- A. - 78
- B. + 5
- C. - 5
- D. - 52

25. Which number sentence is not true?

- A.  $4 + 2 \times 3 = 18$
- B.  $2 + 5 + 1 \times 4 = 11$
- C.  $4 + 2 \times 1 + 3 = 5$
- D.  $2 + 1 \times 4 = 6$

**Part 1 Response Page (continued)**21.     B    22.     D    23.     D    24.     B    25.     A    **Total for Part 1 = \_\_\_\_\_ (Maximum possible: 50 marks)**

65

Part 2: Short-Answer Questions

Give the complete answers in the spaces provided on the response page at the right.

1. Write a number sentence to describe each of the following diagrams of models.

2

a.



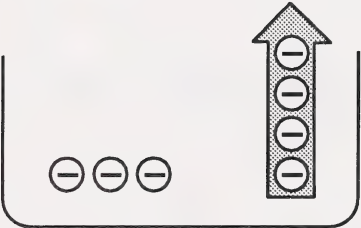
2

b.



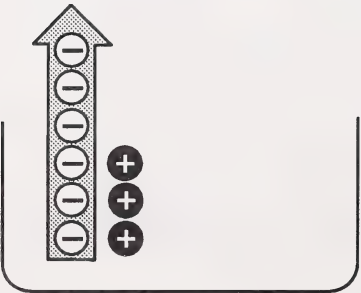
2

c.



2

d.





**Part 2 Response Page**

1. a.  $(-2) + (+3) = +1$

b.  $(+3) + (-4) = -1$

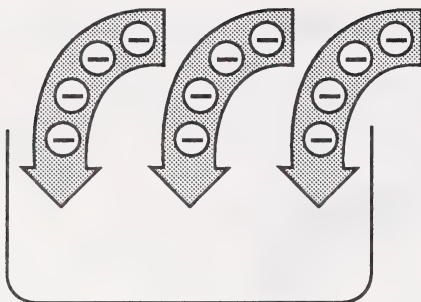
c.  $(-7) - (-4) = -3$

d.  $(-3) - (-6) = +3$

**Part 2 (continued)**

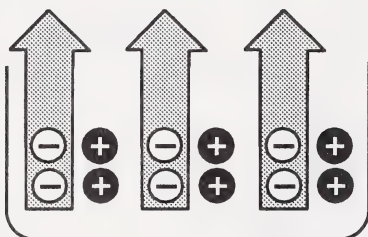
2

e.



2

f.



3

2. Find the prime factorization of 420.

3

3. Find the greatest common factor (GCF) of 18, 36, and 42.

3

4. Find the least common multiple (LCM) of 8, 12, and 18.

**Part 2 Response Page (continued)**

e.  $(+3) \times (-4) = -12$  or  $(-12) \div (+3) = -4$

f.  $(-3) \times (-2) = +6$  or  $(+6) \div (-3) = -2$

2.  $420 = 2 \times 2 \times 3 \times 5 \times 7$

3. 6

4. 72

**Part 2 (continued)**

- 3                      5. Write  $7^4$  in standard form.
- 3                      6. Write 243 as a power of 3.
- 3                      7. Write 30 492 in expanded form.
- 3                      8. Write  $5 \times 10^4 + 3 \times 10^2 + 6 \times 10^1$  in standard form.
- 3                      9. Write 6 492 000 000 in scientific notation form.
- 3                      10. Express  $3.012 \times 10^8$  in standard form.

**Part 2 Response Page (continued)**

5.  $7^4 = 2401$

6.  $243 = 3^5$

7.  $30\,492 = 3 \times 10^4 + 4 \times 10^2 + 9 \times 10^1 + 2 \times 1$

8.  $5 \times 10^4 + 3 \times 10^2 + 6 \times 10^1 = 50\,360$

9.  $6\,492\,000\,000 = 6 \times 10^9 + 4 \times 10^8 + 9 \times 10^7 + 2 \times 10^6$

10.  $3.012 \times 10^8 = 301\,200\,000$

**Part 2 (continued)**

16

11. Evaluate each of the following.

a.  $(-6) + (-2)$

b.  $(+7) + (-4)$

c.  $(+3) - (-4)$

d.  $(-4) - (-6)$

e.  $(-3) \times (-6)$

f.  $(+6) \times (-9)$

g.  $(+39) + (-13)$

h.  $(-56) + (-8)$

10

12. Evaluate each of the following.

a.  $[(+2) - (-6)] - [(-4) \times (-3)]$

b. 
$$\frac{(-8) + (+2) - (-8)}{(+8) \times (-2) + (-16)}$$

**Part 2 Response Page (continued)**

11. a.  $+12$

b.  $-28$

c.  $+7$

d.  $+2$

e.  $+18$

f.  $-54$

g.  $-3$

h.  $+7$

$$\begin{aligned} 12. \text{ a. } & [(+2) - (-6)] - [(-4) \times (-3)] \\ & = (+8) - (+12) \\ & = -4 \end{aligned}$$

$$\begin{aligned} \text{b. } & \frac{(-8) + (+2) - (-8)}{(+8) \times (-2) + (-16)} = \frac{+2}{(-16) + (-16)} \\ & = \frac{+2}{+1} \\ & = 2 \end{aligned}$$

**Total for Part 2 = \_\_\_\_\_ (Maximum possible: 65 marks)**



35

**Part 3: Problems**

Solve the following problems. Answer each question in a sentence. Be sure to clearly show how you arrived at your answer. Place your answers and your work on the response page at the right.

5

1. The prime number 53 is the sum of which six different prime numbers?

2. Fish World sells bait. It sells one size of container with the same number of worms in each. It never splits a container. Mary buys 70 worms, Shawn buys 42 worms, and Fatima buys 56 worms.

4

a. What is the largest number of worms in each container sold by Fish World?

4

b. How many containers does each person buy?

**Part 3 Response Page**

1.  $2 + 3 + 7 + 11 + 13 + 17 = 53$ .

So, 53 is the sum of 2, 3, 7, 11, 13, and 17.

2. a. The greatest common factor of 70, 42, and 56 is 14.

So, the most each container contains is 14 worms.

- b. Mary buys 5 containers, Shawn buys 3 containers, and Fatima buys 4 containers.

**Part 3 (continued)**

- 5                      3. The number of bacteria in a culture dish doubles every hour. If there is one bacteria in the culture dish now, how many will there be after 6 hours?
- 5                      4. Mohammed is investigating a historic building that is between 150 and 200 years old. He realizes that last year the age of the building was a multiple of 7, and that now the building's age is a multiple of 8. How old is the building now?

**Part 3 Response Page (continued)**

3.  $2^6 = 64$

There will be 64 bacteria in the culture dish after 6 hours.

4. The multiples of 7 between 150 and 200 are

154, 161, 168, 175, 182, 189, 196.

The multiples of 8 between 150 and 200 are

152, 160, 168, 176, 184, 192.

Last year the building was 175 years old. Today it is 176 years old.

**Part 3 (continued)****4**

5. a. A helicopter takes off from the Dead Sea which is  $-388$  m or  $388$  m below sea level. It climbs vertically and rises  $4$  m each second. What is the altitude of the helicopter after one minute?

**4**

- b. At the same time, a ship on the Dead Sea lowers a bathysphere. It falls vertically and goes down  $1$  m each second. What is the altitude of the bathysphere after one minute?

**4**

- c. What is the difference between the altitude of the helicopter and bathysphere one minute after they are launched?

**Part 3 Response Page (continued)**

5. a.  $(-388) + (+4) = -384$

The altitude is  $-384$  m or 384 m below sea level.

b.  $(-388) + (-1) = -389$

The altitude is  $-389$  m or 389 m below sea level.

c. The difference is 5 m.

**Total for Part 3 = \_\_\_\_\_ (Maximum possible: 35 marks)**









MATH 8

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